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Farm Chemicals

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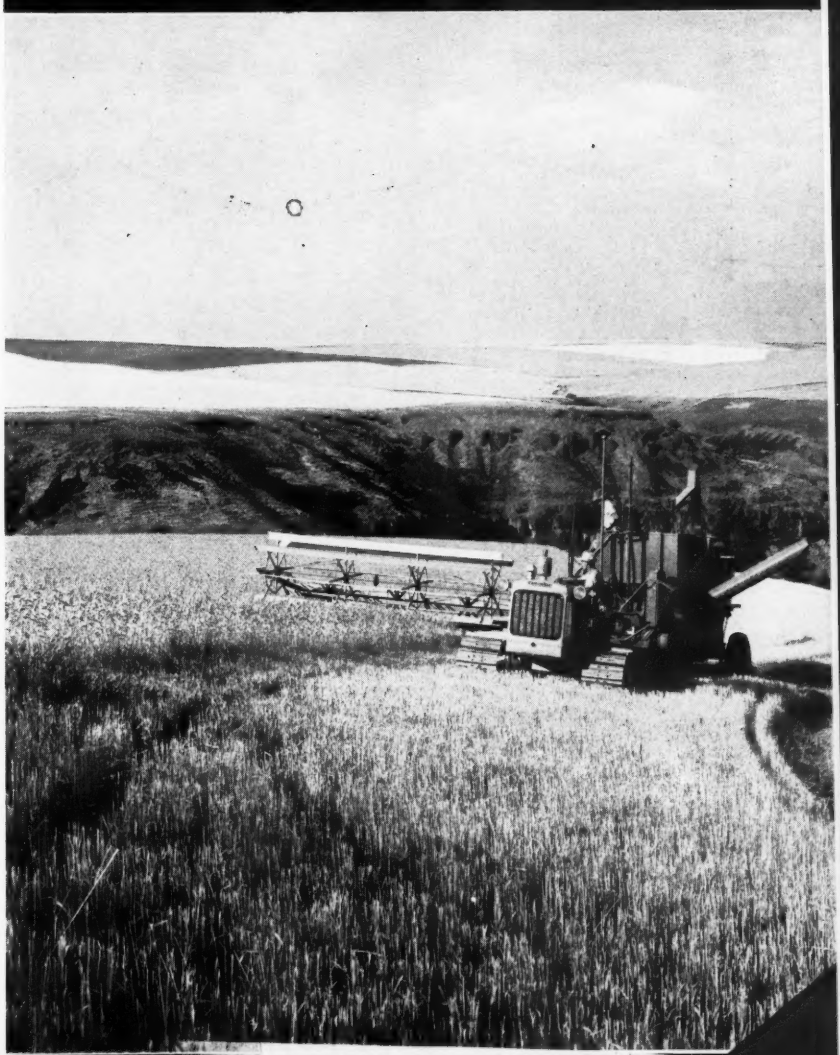

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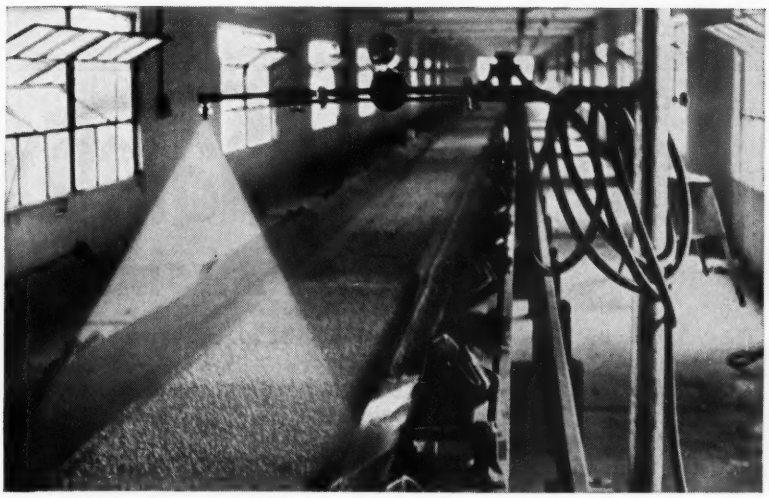

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IN THIS ISSUE

▶ Beginning this month, a new regular feature—**How Would You Decide?**—brings you a collection of case histories in the field of labor-management relations. This monthly roundup of true stories will show you how management has handled every-day employee grievances that went to arbitration. **page 34**

▶ John Harms has been sampling Washington opinion on what effect the end of the Soil Bank's acreage reserve program will have on the plant food market. He's found that the experts believe an increase in fertilizer sales will result. His point-by-point analysis shows how 17.2 million more potential crop-producing acres, coupled with a farm income loss of $700 million, can mean more fertilizer sales for you next year. **page 12**

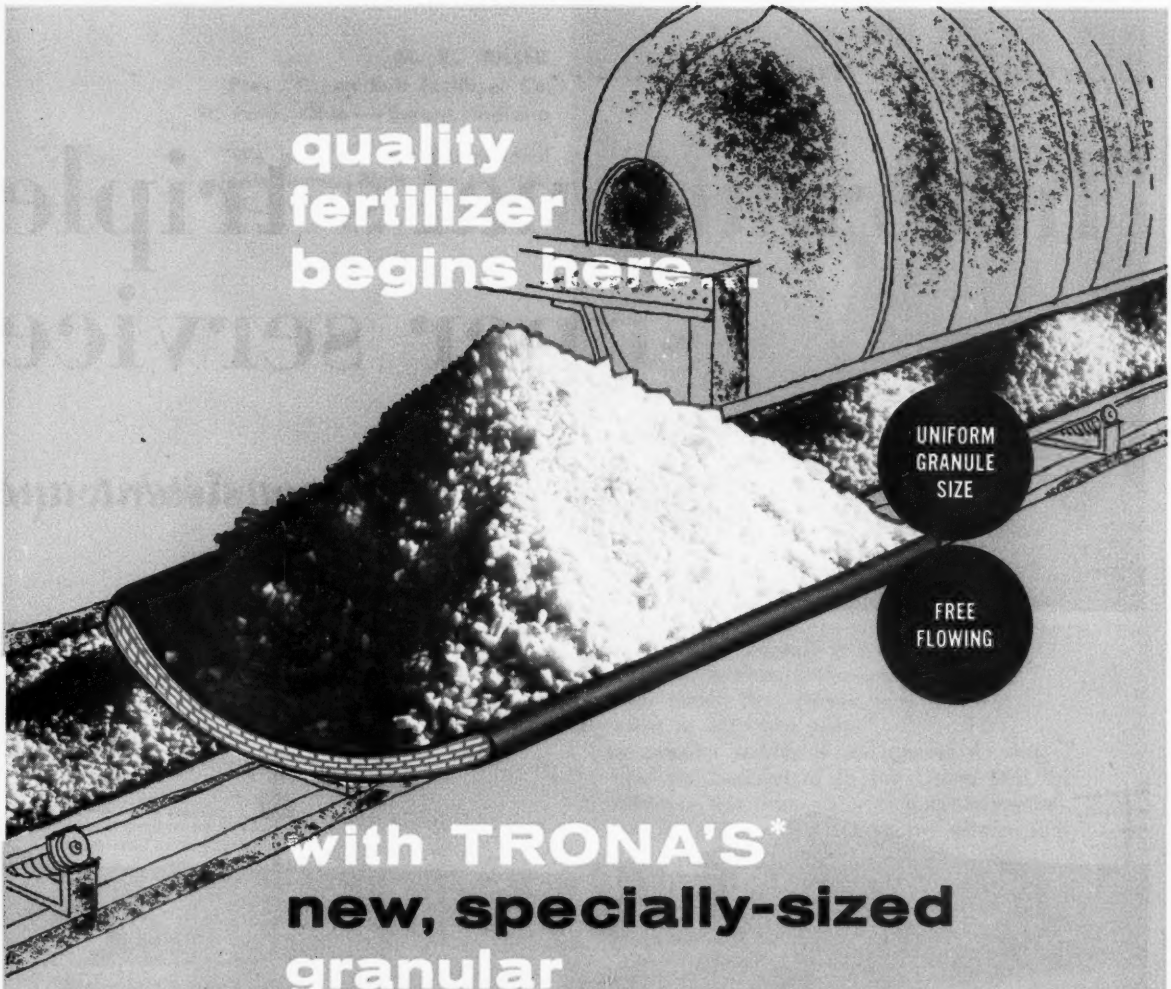
▶ Preliminary findings by USDA scientists may lead to a new approach to insect control. Recent evidence shows that changes in the rate of fertilizing plants may make insects feeding on those plants more or less susceptible to insecticides. **page 14**

▶ In Scotland, as in the United States, fertilizer is being consumed at about three times the pre-World War II rate. A tour of a new plant that will help meet the demand begins on **page 17.**

▶ With new developments in agricultural chemistry, the concepts of what constitutes a fertilizer and what constitutes a pesticide have expanded. The two have overlapped to such an extent that it is sometimes difficult to classify a new product. And new farm chemicals that affect the soil and plant in new ways make the problem even more complex for official chemists. Robert Z. Rollins predicts that "Probably at some future time laws will be developed to incorporate in one text" all farm chemicals. You'll probably understand better why this might be desirable when you see the lists of chemicals and their functions in his article beginning on **page 21.**

COVER PICTURE

Wheat harvested in the hilly palouse region of Idaho is contributing to this year's record crop of winter wheat and expected second largest crop on record of all wheat (raised on 53.6 million acres). What will happen to production records (and surpluses) and farm chemicals sales next year when 17.2 million acres of land are released for crop production? Chances are all three will be looking up.



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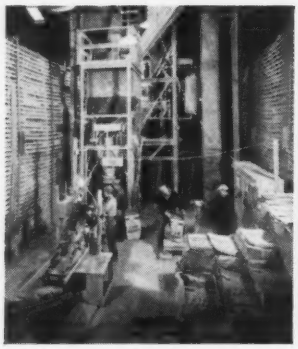

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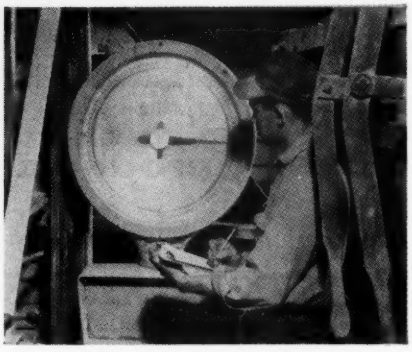

Bob Miller checks the scales that weigh each formula ingredient. Accuracy here gives quality control, helps Green Belt meet and exceed State requirements for mixed fertilizers.

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VIEWING WASHINGTON

with Farm Chemicals Washington Bureau

on agriculture

The Agriculture Department is going all-out to put the Soil Bank's Conservation Reserve program across--sharply increase the amount of land contributed to voluntary retirement. The decision to beef up the program stems from termination of the controversial Acreage Reserve (see page 12), plus disappointing farmer interest in the past. During 1956 through 1958, a total of only about 10 million acres has been signed into the Conservation Reserve program--which pays annual acre rent, plus some conservation costs, for periods ranging up to 10 years.

The land retirement goal for the 1959 program, for which farmers can sign up this fall, is 12.5 million acres. That would bring the total retired through 1959 to 22.5 million acres. Last year the program will be open to farmers is 1960, under present law. The total over-all goal is to retire 31 million acres by that time.

To spur farmer interest, the USDA has increased the ceiling to be paid per-acre from $10 in the past to $25. During previous years, the average rate--$10--became in effect the maximum paid. In addition, USDA will pay a bonus of 10 per cent of the annual rental payment to farmers who put their entire farms into the CR. One serious limitation to getting entire farms into the program is expected to be eliminated. The most USDA has been paying any one farmer is $5,000 a year. This administrative ceiling may be increased to $8,000 or $10,000 for the 1959 and 1960 programs.

From the fertilizer and lime stand-point, however, other changes in the 1959 program aren't as favorable. Through the 1958 CR program, the USDA has been paying 80 per cent of the cost of installing new conservation practices. But starting with 1959, the government's share of the cost will be reduced to 50 per cent--to bring them into line with what the government pays under the Agricultural Conservation Program (ACP).

This change affects primarily the most popular of the conservation practices: the A-2 grass-establishment practice and the accompanying A-4 practice which covers part of the cost of applying "minerals"--fertilizer and lime. D-1 and D-2 winter and summer cover crop practices also are affected. In short, the government from now on will pay only 50 per cent of the cost of these practices, compared with 80 per cent during 1956-58.

Crop prospects this year virtually assure another record outturn, as we indicated first last month. As usual, USDA estimates continue on the conservative side. In the July crop report, USDA conceded: "Total crop outturn equalling

VIEWING WASHINGTON

agriculture continued

any previous year now appears likely for 1958." In many of the recent years, the USDA has under-estimated the potential in early months. Yields per-acre once again will smash earlier records. At this point in the growing season, the yield per acre index is at 129--two points above last year's record. Planted acreage for 1958 harvest totaled 330 million acres--the smallest in 40 years. Principal acre reductions are in sorghum grains, oats, cotton, flax-seed and hay crops. Sharp planting increases were made in winter wheat, spring wheat and soybeans--plus important but relatively smaller increases in corn, rice, dry beans, potatoes, sugar cane, sugar beets and some vegetables.

A "new direction" in federal farm programs is at least two years in the future--unless 1959 production brings on stringent emergency measures. Aside from some farm bills passed this year, few observers in Washington expect the farm policy stalemate between Secretary Benson and the "farm bloc" to melt. This, however, may change if 1959 production goes much above this year's levels, forcing drastic federal curbs. Or, if the GOP gains control of Congress in the elections this fall, Benson would be almost assured of major revisions in his favor.

The Agricultural Conservation Program (ACP) has just received another vote of confidence from Congress. Prior to the current session, Congress had authorized the $250 million program for two years in advance. But this year, Congress ordered that it be authorized for four years. This is seen as a direct slap at the Administration, which has been attempting to cut the available funds in half, and to put ACP under management of the Soil Conservation Service. Earlier, Congress ordered that no major changes be made in ACP unless they were first advocated by local committees.

Corn producers who ignore planting allotments this year very likely are to be offered price support again. USDA officials say there is nothing in the picture this year which is different from conditions during the past two years when non-compliance support was granted. The program of supplying price supports to farmers who ignore government planting curbs is a perversion of the theory of federal supports and allotments. The original idea was that farmers would be guaranteed a certain level of price in exchange for observing planting rules. On the other hand, farmers who didn't stick with the rules would be penalized by not getting supports. The switch was instituted by Secretary Benson two years ago to put an effective floor under corn, following signs that few producers actually were observing the rules.

Announcing the Revolutionary

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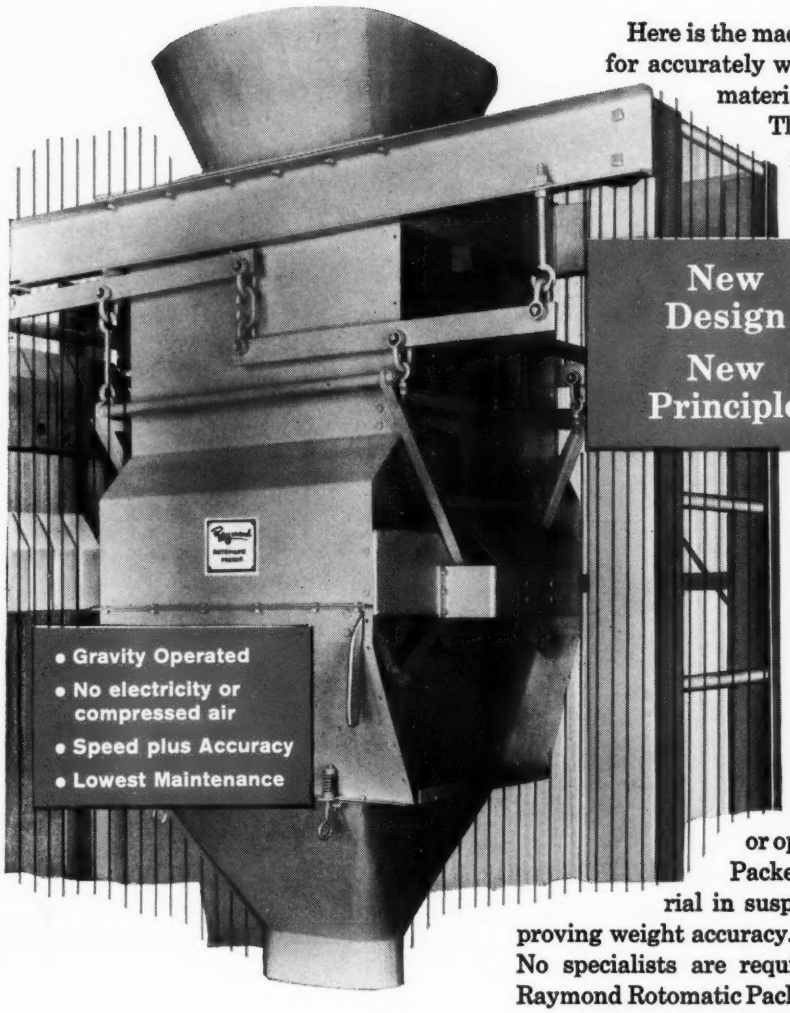

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► 17.2 million acres of farmland
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► $700 million cut in farm income subsidy

This point-by-point analysis explains why

END OF ACREAGE RESERVE

THE FEDERAL government next year will release 17.2 million acres of productive farmland back into active crop production. This is land retired for one year in the Soil Bank's Acreage Reserve, due to be terminated after the 1958 crop year.

The impact of this newly-available farmland is likely to be felt throughout the agricultural economy, and is expected to make a difference in next year's fertilizer market. It is land upon which major fertilizer-use crops had previously been grown—cotton, corn, wheat, rice and tobacco.

How much of a difference in fertilizer consumption it may make, no one is willing to forecast, according to our survey of expert opinion in Washington. There is agreement, however, that no reduction in consumption will result. Apparently, the effect will be "up"—but how much, no one can say.

Land Regained, A Crutch Lost

The end of the Acreage Reserve not only is significant from the stand-point of throwing more land into production, but from the fact it will reduce farm income considerably next year. With AR demise the government will pull a $700 million crutch from under the agricultural economy. That is the level of payments to be made to farmers for retiring 17.2 million acres of productive land in 1958.

Termination of payments will be felt most in the Southeast and the Midwest, the two most prominent fertilizer-use regions. Of the total $700 million in payments this year, and to be withheld next year, the Southeast will receive about $235 million. The Midwest gets approximately $300 million. Together, Southeast and Midwest get the lion's share of the funds, about 5/7ths.

Under the Acreage Reserve, which has been embroiled in controversy since it was launched in 1956, the Agriculture Department pays relatively high rates per acre for retiring land from production of the five crops for one year. Purpose of the program was to help reduce surplus production. It has been pronounced a failure by both USDA and Congress in terms of reduced production obtained for the money spent—roughly $2 billion in 3 years.

This program should not be confused with the Conservation Reserve section of the Soil Bank, which has blessings from all sides and will be strengthened for 1959. Under CR, the government pays annual rent per-acre, plus part of the cost of installing conservation practices, for general crop land retired from production for periods ranging up to 10 years.

Release of the 17 million acres raises two key questions:

- How much of this actually will get back into production of crops from which it was removed? While there is wide disagreement among experts in Washington, consensus is that most of it will again produce crops—although crop shifts will be prevalent, such as from cotton to corn, corn to wheat and so on. There appears to be little doubt that the released land will contribute to mounting surplus production. Many farmers have improved soil condition of retired land through grass-seeding practices—pointing to increased productivity.
- Can and will farmers maintain income levels by increasing volume in the face of the $700 million gap to be left by termination of the program? Consensus is that the trend toward greater efficiency and intensified farming will permit farmers to overcome at least a large part of the deficit. In the view of officials here, this indicates opportunity for the fertilizer industry.

The two pressures—to utilize released acres and the need for making up a projected income deficit—create a climate, temporarily at least, for a surge in plant food sales. In the broader view, they foreshadow tremendous field crop production in 1959. The potential is there. Coming on top of an indicated record output in 1958, this country may be faced with the biggest surplus problem in history (although an explosive international situation could turn that into a blessing).

Another bullish factor on the fertilizer market

E WILL BOOST FERTILIZER SALES

BY JOHN HARMS

from the AR termination, according to Washington experts, is that most of the acreage in the AR is located on medium to small-sized farms. It is on these farms that plant food use has lagged behind optimum levels. But, it is believed, these farmers have found a new appreciation for fertilizer use—since they've had to increase production on fewer acres.

Sales to Smaller Farms May Grow

As the "banked" land becomes available once more, the belief is that these farmers will apply newly-learned techniques, including optimum fertilizer use, on their increased acreage. This would produce a decided "plus" on the fertilizer market, it is thought.

As Washington sees the year ahead, there are few minus signs in the outlook relative to the plant food market. There are at least two minus quantities, *but they are expected to be out-weighed by the plus factors.*

The first "minus" is the farm income situation at the present time. Total farm net income this year—to be spent mostly in the first half of 1959—is expected to be up about 15 per cent. A new record-high of gross income, $37–$38 billion is in prospect. While this may look encouraging on the surface, the fact is that almost the entire increase over year-ago income is showing up in livestock. Generalizing, it means that cattle and hog producers are making the money this year—and field crop producers are making little if any increase.

Over-all it indicates that spending by farmers will be up considerably for items used in production of livestock, while spending for items (such as fertilizer) used in field crop production may not be up a great deal. A major part of livestock, of course, is feed grains—but we already have a surplus of those at lower prices to farmers. Thus, whatever increases in plant food purchases there are next year will be coming from the pressure to increase volume—not from increased farm spending power.

The other possible "minus" factor lies in the Conservation Reserve. The USDA is offering higher rental payments for the 1959 program—for which farmers can sign up in September–October—and believes the CR may get a sizable quantity of Acreage Reserve land. Actually, the CR has yet to show its attraction for Midwest farmers.

Bushel and Pound Controls

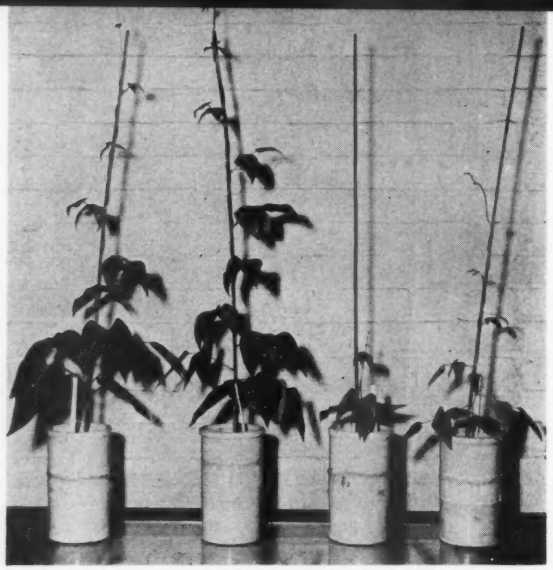
A longer-term consideration for the industry is the farmer's potential for piling surplus onto surplus. The obvious failure of present federal methods of curbing surplus production may result in even more stringent methods in the immediate years ahead. There already is talk in official circles that controls on units of production—bushels and pounds—may be necessary. If it comes, it undoubtedly would take the bloom off the fertilizer market, since farmers would be limited to the amount of units they could raise per acre—in contrast to current acre restrictions and "grow what you can on those acres."

End of Acreage Reserve Boosts Existing Trend

Perhaps the most significant comment we found in our survey of the experts here, is one offered by a USDA expert. He says: "Fertilizer goes much deeper than the Soil Bank." *His point is that while the Soil Bank, or lack of it, may have temporary effects on fertilizer consumption—the over-riding influence is the long-term revolution taking place in agriculture.*

He says the trend in fertilizer use is up. The termination of the AR may add some *oomph* to that trend, but it will be only temporary. Of greater significance are such things as the trend toward fewer acres, and the continuing stress to substitute capital inputs for labor. Also significant are shifts between crops in the various regions—shifts that may be accentuated by the Soil Bank, but certainly are not limited to it. The prime example, of course, is in the South where cotton is losing importance, and other crops, such as corn, livestock and trees, are on the ascendancy. ▲

HOW CAN PLANT NUTRITION AFFECT INSECT CONTROL?



Mites are easier to kill with malathion on healthy lima bean plants (left) fed enough nitrogen for good growth. They are harder to kill on plants (right) supplied no nitrogen. USDA Photo.

SCIENTISTS of the U. S. Department of Agriculture came up recently with what looks like one clue to why insects seem to vary in susceptibility to insecticides. If later research backs up the preliminary findings, it may mean a whole new approach to insect control.

These USDA researchers found indications that two-spotted spider mites (*Tetranychus telarius* L.) attacking pole lima beans were easier to kill with malathion when the plants were properly fed. They found the mites harder to kill when the host plants got *either more or less* than the right amounts of nitrogen and potassium for good growth. Mites were also harder to kill on plants supplied with excess amounts of phosphorus.

The scientists think this may mean that changes in the amount of food the plants get make insects attacking the plants more or less susceptible to insecticides. This suggests that there may be advantages in timing insect control practices according to seasonal variations of food in plants.

The investigators also hope to shed some light on the possible effects variations in plant growth—caused by changes in light, temperature and horticultural practices—may have on the susceptibility of insects to insecticides.

These experiments are being conducted at USDA's Agricultural Research Center, Beltsville, Md., by entomologist Thomas Henneberry and plant physiologist N. W. Stuart.

Thomas Henneberry, USDA entomologist, counts the number of mites on leaves of pole-lima beans that have been fed different fertilizers and treated with malathion. USDA Photo.

Nutrient solutions are applied to the experimental bean plants the first day after potting and twice a week thereafter. Different levels of nitrogen, phosphorus, and potassium are being tried independently and in combination, along with necessary trace elements, on plants grown in sand.

A stock solution of ammonium sulfate, calcium nitrate, potassium phosphate, potassium sulfate, sodium and phosphate, magnesium sulfate, boric and zinc sulfate, copper sulfate, ferrous sulfate and manganese chloride is prepared. This stock solution is diluted and delivered to the plants to supply the appropriate parts per million of minerals for the high and low concentrations of nutrients.

In the first experiments, the low level for each of the mineral elements (N, P, K) was as follows: nitrogen—28 ppm (parts-per-million); phosphorus—6.2 ppm; and potassium—7.8 ppm. The high level of nitrogen was 5 times the low amount. High levels of phosphorus and potassium were 10 times the low amounts for these nutrients.

Spider mites were inoculated on the bean plants, and their progeny were tested for susceptibility to malathion.

Optimum amounts of nitrogen, phosphorus, or potassium made the spider mites feeding on these plants easier to kill with malathion.

Spider mites were more difficult to kill when too much or not enough nitrogen or potassium was applied.

However, mites were easier to kill when feeding on plants that had received a low level of phosphorus.

Subsequent experiments may help to determine the advantage of timing insect control practices with seasonal variations of nutrients in plants. The continued research may also disclose *why* susceptibility of spider mites to an insecticide decreases when nutrient levels are above or below plant requirements.

Additional experiments are now in progress, involving a larger number of plants and more varied levels and combinations of the nutrients. ▲

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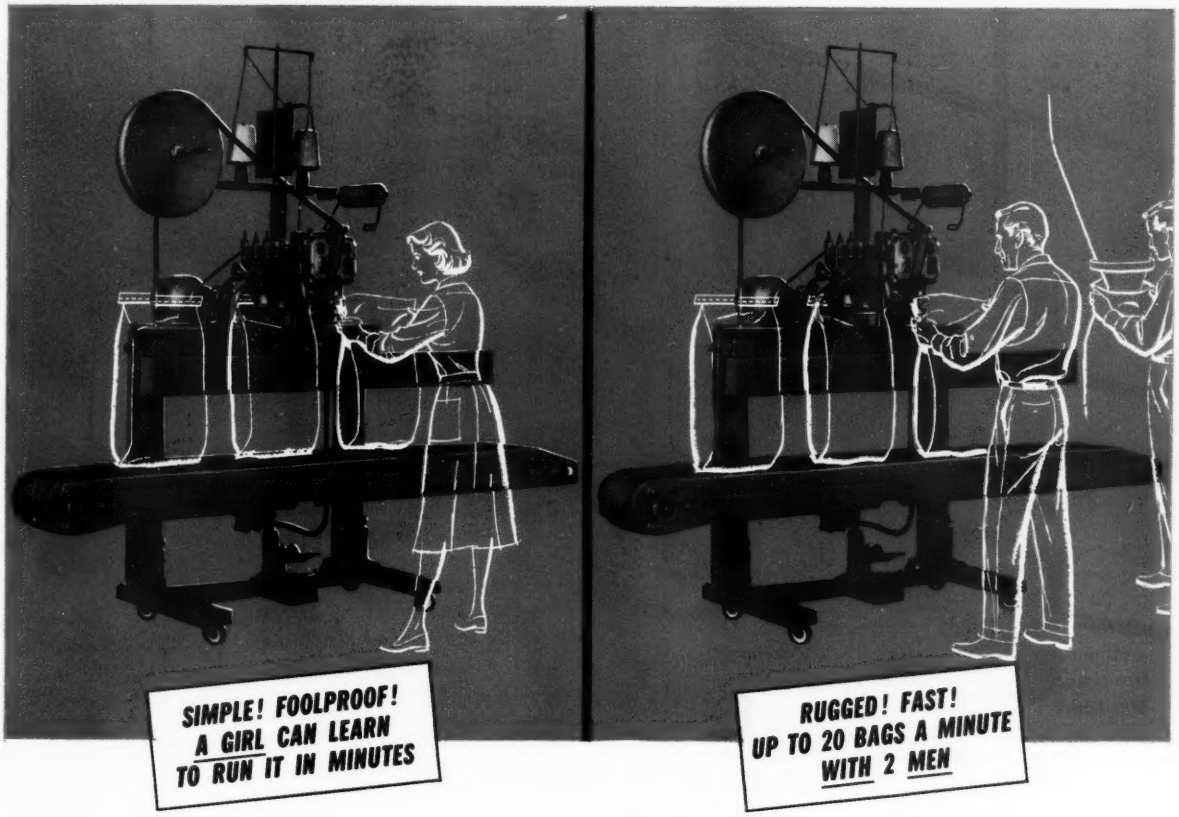

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A tour of the new
SAI PLANT IN SCOTLAND

BY J. GRINDROD

ABOUT 150,000 tons of ammonium phosphate-based complete fertilizers will be produced annually at Leith—near Edinburgh, Scotland. Most of the output is expected to be consumed in Scotland, where fertilizer consumption is three times greater than before World War II.

The Scottish Agricultural Industries Limited plant that began operating in March cost about $8½ million and employs 220 people.

Processing at the new plant consists of raw material receipt and storage, sulfuric acid manufacture, phosphoric acid manufacture, ammonium phosphate manufacture and preparation of concentrated complete fertilizer, finished product storage and shipping.

Since most of the raw materials arrive at Leith by sea, a belt conveyor system has been provided to handle these materials direct from ship. Discharge from the ship is by high-speed grabbing cranes which feed the 1,470-ft. long conveyor system at a rate of up to 350 tons per hour. Located in a tunnel alongside the unloading berth, the first conveyor connects to a series of conveyors housed in enclosed gantries which pass overhead to the main storage building. A continuous belt weigher is incorporated in the system.

For those materials arriving by rail a wagon tippler is provided. By way of an elevator, this feeds the 350 tons per hour distribution conveyor system in the main storage building which is 900 ft. long x 100 ft. wide x 60 ft. high to the top of the conveyor gantry. The latter runs practically the entire length of the building. Sub-divided by movable Stelcon precast concrete bulkhead sections to accomodate the different raw materials, the store has a total capacity of 56,000 tons. Reclamation is by mechanical shovel which feeds the elevator and conveying system.

Sulfuric Acid

Sulfuric acid is produced at the new Leith plant by means of a Simon-Carves-Monsanto 175 tons H_2SO_4 daily capacity sulfur burning contact plant, though space has been left and the plant so designed that later conversion to pyrites burning could be effected should sulfur become unavailable or uneconomic.

Sulfur is stored in a section of the raw materials shed screened off from the phosphate section—since fluorine from the latter would seriously affect the vanadium catalyst in the converter. Reclaimed by shovel, the sulfur is melted in an underground brick-lined pit, the overflowing molten product being pumped through a Kelly pressure filter to a clean sulfur storage pit. Pressure filtering removes ash down to a level of 0.05 per cent and also some of the bitumen present in the darker grades of sulfur. Burning of the sulfur takes place in a stream of preheated air to SO_2 of around 7.5 per cent concentration. The air for combustion is dried by passing it through a steel tower packed with ceramic rings and irrigated with 94 per cent sulfuric acid. The temperature of the gases leaving the burner is reduced from about 980° C. to 400° C. by passage through a waste heat boiler operated at 360 p. s. i. with elements of the Foster-Wheeler type, the steam from which drives a turbo-blower and a 300 kw turbo-generator. From the latter units low-pressure steam is available for space heating and process use.

On their way from the boiler, the gases are cleaned of any suspended matter in a hot gas filter filled with graded quartz. Conversion to SO_3 is accomplished by passage through four catalyst beds contained in a single converter vessel. At the first catalyst bed, exothermal reaction heats the gas from 425° C. to 600° C. and it passes to second stage heat exchanger where the dried air going to the sulfur burner is preheated and the SO_2 and SO_3 gases cooled. On leaving this stage the gases are cooled by the addition of cold, dry quench air and the mixture is fed into the third pass of the converter, in which most of the remaining conversion takes place. From it the gases pass over the superheater elements from the boiler before entering the fourth pass.

Leaving the converter at around 410° C., the gases pass into a boiler feed water economizer and thence through an SO_3 vertical tube and shell heat exchange cooler where the temperature is controlled to around 180° C. to 200° C. for absorption. This takes place in a steel absorption tower packed with ceramic rings

In this article all tons are long, 2240 pounds.

over which 98.5 per cent sulfuric acid is circulated and from which the gases leave with an acid content of about 1.7 grains of SO_3 per cu. ft., being discharged direct to the atmosphere through a 150 ft. steel chimney. Circulated over drying and absorption towers, the acid passes through banks of cast iron Newton Chambers needle-tube coolers over which sea water is passed to dissipate the heat generated, in one case by drying the air and absorbing moisture in 94 per cent H_2SO_4, and, in the other case, by the absorption of SO_4 in 98.5 per cent H_2SO_4 and subsequent redilution to 98.5 per cent H_2SO_4. Sulfuric acid is stored in three 33 ft. diameter, 32 ft. 6 in. high mild steel tanks with aggregate capacity of 3,900 tons.

Phosphoric Acid

For phosphoric acid manufacture, the wet process is used involving the reaction between sulfuric acid and phosphate rock to give calcium sulfate and phosphoric acid, calcium sulfate as gypsum being removed by filtration from suspension in the phosphoric acid.

Designed by the Engineering and Industrial Corporation of Luxembourg, the Prayon plant at Leith incorporates two large steel reaction vessels lined with rubber and carbon brick, each of which is divided into four compartments, space being left between each pair to detect any leakage.

Crushed phosphate rock is fed in steady and controllable flow by a Simon weigh-belt feeder through an air-swept Bradley Poitte mill to the reaction tanks into which are also fed sulfuric acid and dilution water metered from constant head tanks by flow through nozzles of known aperture, and weak phosphoric acid from the filtration section. Conditions of feed are varied to give best results under different plant conditions. In general, the reaction takes place mostly in the first halt of the attacking system, the second section serving mainly to age the magma and produce the gypsum slurry in easily filtrable form. The magma is kept in fairly vigorous movement by agitation and circulation, the recycle of magma passing from the sixth to the first reaction compartment through two evaporative coolers which provide temperature control.

From the last reaction compartment an exact proportion of the magma is passed to the 18-cell Prayon filter which consists of a tray-sectioned annular ring which rotates, horizontally, bringing each tray or cell in turn into position for the various washing and filtration operations. The trays are of stainless steel and the cloths of synthetic fiber supported by a perforated rubber backing. As the magma is fed onto the tray the strong phosphoric acid is filtered off under vacuum and fed to storage tanks.

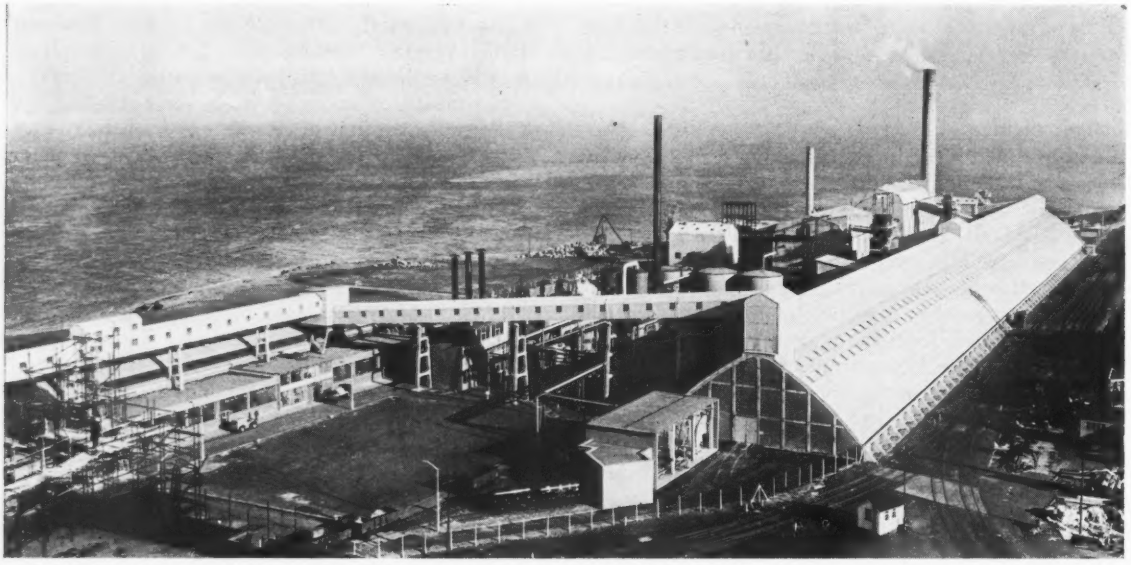
The remaining cake is given three successive washes under vacuum, the acid from the first wash, containing about 26 per cent P_2O_5, being recycled to the attacking system. The washed gypsum is tilted into a disposal screw mixer, where it is slurried with sea water and fed into the main factory outfall drain. The process is controlled by instruments grouped in a control room on the top floor of the plant.

Granular Fertilizer

To produce ammonium phosphate-based granular NPK fertilizers a Dorr-Oliver plant constructed by Simon-Carves is used. Phosphoric acid is neutralized by a stream of ammonia gas which is distilled from synthetic or by-product liquor brought into the factory. The resultant slurry of ammonium phosphate is added to sulfate of ammonia and muriate of potash in the required proportions, granulation being effected by mixing with a re-cycle of dried compound in a blunger.

To produce this type of fertilizer by the Dorr-Oliver process, however, the strength of the phos-

(Continued on page 53)



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Normal Superphosphate	493
Nitrogen Solution: (25% NH_3; 69% NH_4NO_3)	62
Anhydrous ammonia	88
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1 Page — 2-colors —
Farm Chemicals, Aug., 1958;
Commercial Fertilizer & Plant Food Industry, Aug., 1958.

FERTILIZER OR PESTICIDE?

BY ROBERT Z. ROLLINS

Years ago there were fertilizers and there were pesticides. The two kinds of materials were quite different and there was no confusion between them. Now there are mixtures of fertilizers with pesticides. There are fertilizers with some incidental pesticidal values as well as pesticides with some incidental fertilizer values. There are materials that simultaneously act as fertilizers as well as pesticides. There are materials that are used in certain ways on certain crops as fertilizers and used in other ways on other crops as pesticides.

To complicate the problem, a number of new chemicals have been developed to affect soils, plants and crops in ways undreamed of in earlier years. The concepts of what constitutes a fertilizer and what constitutes a pesticide have expanded with the developments in agricultural chemistry since the war. The two fields have grown together and overlapped to such an extent that it is sometimes difficult to classify some of the new products that appear on the scene.

The author says he has "attempted to document the confusion that exists and to give a few examples to indicate that many of the agricultural chemicals that are appearing on the market, and that will appear in the coming years, are in the twilight zone between simple nutrients, like NPK, and simple pesticides, like DDT."

Fertilizers

ORIGINALLY, fertilizing materials were those that supplied the major plant nutrients, nitrogen, phosphorus and potassium; then they included calcium, magnesium and sulfur; and now the micronutrients copper, manganese, zinc, iron, boron and molybdenum. Fertilizers were regarded as something applied to the soil to feed the plant.

Then a number of other developments began to broaden the field of fertilizing materials. It was found that some of the micronutrients, and more recently even some of the major plant foods, could be effectively applied as foliage sprays by the same equipment and in the same manner that pesticides are applied.

Pesticides

Similarly, years ago, pesticides were materials that killed insects, fungi, weeds, rodents and other undesirable organisms. Some pesticides began to be applied in the same way that fertilizing materials are applied. (For example, to the furrows when planting seed, or injected into the soil.) Some systemic pesticides were found that were absorbed by plants, just as they absorb nutrients, and thereby control pests. Thus, we have fertilizers applied in the same way as pesticides have been applied, and pesticides applied as fertilizers have been applied.

Mixtures of Fertilizers with Pesticides

Since both kinds of materials could be applied in the same ways, the next step was the development of mixtures of fertilizers with pesticides so that one application of the mixture—as a spray, dust or applied to the soil—served two purposes in feeding the plant and protecting it from pests. Although such mixtures make a combination fertilizer-pesticide, they do not present any difficulty in registration, labeling and sale. It seems clear and reasonable that such combination products intended to serve two purposes should be labeled with two statements of composition, one showing the fertilizer guarantee and one showing the pesticide guarantee.

Multi-Purpose Materials

A further complication arises with materials that serve a dual purpose or serve several purposes either separately or simultaneously. There were some dual-purpose materials even years ago. For example, calcium cyanamide, widely sold as a commercial fertilizer, was also used as a pesticide to control weeds and certain soil organisms. Lime-sulfur solution, widely used as a pesticide, was also used for treatment of alkaline soils. Bluestone was used as a pesticide to make bordeaux mixture and was also applied to the soil as a plant nutrient to correct shortages of copper in the soil. Large amounts of elemental sulfur were applied to plants to kill pests and large amounts were applied to the soil to reduce alkalinity.

Many more of these multi-purpose materials have been developed. For example, the same formulations of 2,4-D or 2,4,5-T used to kill weeds are also used to reduce fruit drop on citrus, to keep the "buttons" on harvested lemon fruits, to promote a desirable red coloration of apricots, and there have been some reports that certain uses of these compounds may in-

crease the crop yield of some plants. Maleic hydrazide is used for control of weeds and also to reduce the sprouting of potatoes. Certain metallic carbamates have nutritional values. For example, maneb not only provides control of certain fungi, but it is reported to alleviate deficiencies of the plant food manganese.

There have been reports that certain fertilizing materials may have indirect pesticidal value. Certain metal chelates—applied for correction of a nutritional deficiency—have seemed to inhibit development of mites on the plant. Some soil fumigants give plant responses beyond what can be attributed to pest control.

To add to the confusion, a farmer might use either a fertilizer or a pesticide for a certain need. For example, if his trees are suffering from a copper deficiency, he might correct it by applying bordeaux mixture—a pesticide, or by applying copper chelate, copper frits, or copper sulfate—all fertilizing materials.

New Kinds of Farm Chemicals

The tremendous developments in agricultural chemistry are providing dozens of new compounds to affect soils, and plants, and crops in new ways. They do not kill pests and they do not feed plants as "classical" pesticides and fertilizers do, and still they are like these two kinds of materials. They are purchased from the same dealers and applied in the same ways.

Some of them seem to be closely related to fertilizers because they make plants grow better or they produce desirable changes in crops or soils, for example:

Indolebutyric acid, naphthalene acetic acid, naphthalene acetamide and phenylacetic acid, to promote rooting of cuttings.

Inoculants of nitrogen-fixing bacteria for legume plantings.

Carbon dioxide injected into irrigation water to acidify alkaline soils.

Alkyl aryl sulfates or sulfonates, and similar wetting agents to improve penetration of the soil by irrigation water.

Polyelectrolytes, enzymes, plant extracts and lignin preparations to improve the texture of compact and difficult soils.

Parachlorophenoxyacetic acid to improve set of tomatoes and berries, and to produce parthenocarpic fruits of Calimyrna figs.

Parachlorophenoxyacetic acid and benzole 2-oxyacetic acid to increase the size of Thomson seedless grapes.

2,4-Dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid and naphthalene acetic acid to increase the size of citrus fruits and to reduce excessive drop of deciduous fruits.

2,4-Dichlorophenoxyacetic acid to increase the yield of latex from rubber trees.

Ethylene chlorohydrin to break dormancy in potatoes.

Maleic hydrazide on potato plants and methyl ester of naphthaleneacetic acid on the tubers to prolong dormancy in potatoes and to prevent sprouting.

Tri-iodobenzoic acid to promote flowering in pineapples.

Allantoin to promote healing of pruning cuts on trees.

Colchicine to induce polyploidy.

Gibberellic acid to make plants grow taller or more rapidly.

Maleic hydrazide to make plants grow more slowly.

2,4-Dichlorophenoxyacetic acid to promote coloration of potatoes and apricots.

2,4,5-Trichlorophenoxyacetic acid to delay coloration of lemons.

N-meta-tolyl phthalamic acid to increase flowers and prevent fruit drop on certain crops—as on cotton to increase lint and seed production.

Vitamin B_1 to aid in overcoming the shock of transplanting ornamentals.

Naphthaleneacetic acid and 2,4,5-trichlorophenoxy propionic acid to reduce pre-harvest drop of apples and to improve color of the fruit.

Naphthyl acetamide to promote rooting of cuttings, to aid in transplanting plants, and to increase the set of tomatoes.

Some of the new materials seem more closely related to pesticides because they kill a pest or at least a part of a plant, for example:

Sodium chlorate, calcium cyanamide, pentachlorophenol, sodium ethyl xanthate, tributyl phosphorotrithioite, and many other compounds to defoliate cotton plants at harvest time to facilitate picking.

Dinitro-o-secondary butyl phenol, pentachlorophenol, disodium, 3,6-endoxohexahydro phthalate and other compounds to desiccate legume seed crops at harvest time to improve harvest of the seed.

Sodium chlorate and sodium chloroacetate to desiccate rice and milo at harvest time to improve the crop and promote drying.

Sodium arsenite to kill tops of potato plants at harvest time.

Dinitrocresol and naphthyl acetamide, and dinitro-ortho-secondary butyl phenol to kill blossoms on trees grown as ornamentals where no fruit is wanted and to reduce fruit set on apple and peach trees.

Bacillus popillae (milky disease) for control of Japanese beetle and B. thuringiensis for control of alfalfa caterpillar.

Viruses for control of rats and rabbits.

Sometimes a chemical acts in an indirect way or in an unknown way to produce a beneficial effect. Elemental sulfur applied to the soil does not appear to provide any direct fungicidal control of scab on potatoes but in acidifying the soil it provides an environment that is not favorable for development of scab. It was known for a number of years that applications of zinc compounds corrected mottle leaf on citrus even though it was not known at that time whether the disturbance was caused by a fungus or by a nutritional deficiency.

There have been many reports of experiments wherein fungicides increased yields in experimental plots that could not be accounted for by the disease control observed. It is not clear whether they may have controlled some pest, or contributed to the nutrition of the plant either directly or through some action on soil micro-organisms. Chemicals were applied for control of such things as monkey face on olives, black heart on celery and psoriasis on citrus trees before the experts had agreed upon the cause of the trouble.

There is another group of products still further out on the fringe of farm chemicals which are probably not in the scope of any of the present laws. These include:

Zineb for protection of plants from damage by smog.

Preservatives for cut flowers.

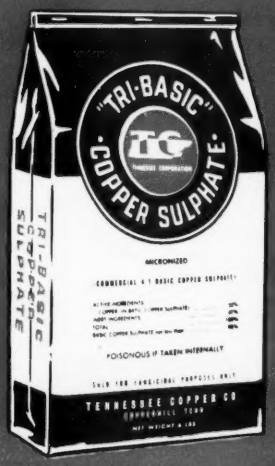
Colorants for flowers and lawns.

Wax and oil sprays and dips to improve the appearance of vegetables and ornamental foliage and to inhibit loss of moisture when transplanting nursery stock.

Anti-oxidants to prevent discoloration of the cut butts of asparagus and lettuce.

Ethylene oxide and other fumigants to promote coloration of harvested fruits.

(Continued on page 24)



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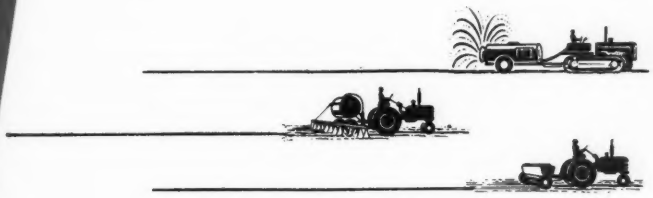

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Some of these chemicals are just in the experimental phase or are marketed only in the small-package trade for garden use, but many of them are important in California agriculture where their wide-scale use has become standard practice. These materials are commonly sold by the same firms that market other pesticides and fertilizers; they are applied in the same manner and with the same equipment as pesticides and fertilizers are applied, and in some cases they are applied in combination with other pesticides or fertilizers.

If a chemical increases the yield of a crop or improves the quality of a crop, a farmer is not likely to distinguish between the way in which the chemicals act. It is reasonable to expect that the laws will provide the same kind of control over all of them.

National Action

Although nearly all states have a fertilizer law and a pesticide law, the scope of the laws differ. Apparently many of the new types of farm chemicals are not widely used in all parts of the country and they have not been a matter of much concern elsewhere. Recently national interest in some of these products has increased. The various industries concerned and the regulatory agencies of the various states and the federal government are now considering how the products should best be handled from the regulatory standpoint

Some groups would like to have all these new types of agricultural chemicals classified as pesticides. They point out that there is a federal law on pesticides and a national Association of American Pesticide Control Officials, which could handle the registration and regulation of these materials uniformly throughout the country if they were classed as pesticides.

On the other hand, although most of the states have similar laws with regard to fertilizing materials, and the Association of American Fertilizer Control Officials facilitates uniform state actions, there is no federal fertilizer law and opinion is divided on whether such law should be encouraged.

One of the main reasons for wanting these new materials to be regarded as pesticides is that action could then be taken through the machinery of the "Miller Bill ' to secure appropriate action on any tolerance that might be needed. The "Miller Bill" amendment to the Federal Food, Drug, and Cosmetic Act has established a well-functioning petition procedure for securing action on tolerances for residues of substances that are included in the scope of the Act.

Defoliants, and substances for controlling nematodes, snails, slugs, algae, moles, birds and certain other pests are not registrable under the federal law as pesticides and, therefore, tolerances cannot be secured through the "Miller Bill" procedure. Tolerances for these other products can be secured through a hearing procedure provided in the federal law, but industry has been reluctant to utilize this means. However, it does not seem reasonable to drag into the scope of a pesticide law a number of farm chemicals sold for other purposes merely to facilitate action on tolerances which can be handled in other ways.

Dual Labeling and Registration

When a firm deliberately prepares a mixture of a fertilizer and a pesticide to serve a dual purpose, it does not seem greatly out of line to require duplicate registration with payment of duplicate fees and to require the label to show two statements of ingredients. But as more and more dual-type products appear on the market the reasonableness of the present legal requirements becomes more and more questionable. If maneb controls fungi and alleviates manganese deficiency, the present laws, operating independently, require the firm that markets it to register it both as a pesticide and as an agricultural mineral and pay both fees.

There are several differences between legal requirements for fertilizers and those for pesticides. A tonnage license tax, but no sales tax, is paid on agricultural minerals or commercial fertilizers and a sales tax, but no tonnage license tax, is paid on pesticides in California.

The guaranteed analysis of a fertilizing material is commonly expressed in terms of equivalents—elemental nitrogen, phosphorus pentoxide and potassium oxide. The statement of ingredients in a pesticide commonly shows the name of and percentage of each active ingredient and the total percentage of inert ingredients.

The labels of fertilizers rarely show any directions for use. The labels of pesticides must show adequate directions for use.

Physical form of a fertilizing material is generally of secondary importance. Physical form of a pesticide dust is of major importance.

One Big Law In Future?

It is quite evident that every function and development of plants and animals may, and probably will be, subject to control by chemicals. It seems possible that relationships will be found between the nutrition of plants and their resistance to pests. (Ed. note: See page 14.) Probably at some future time laws will be developed to incorporate in one text the chemicals that are used for their nutrient value, the chemicals that are used to kill pests and the other chemicals that are used to influence soils, plants and animals in many additional ways.

With such an inclusive law we would not have to decide whether registration should be secured as a fertilizer or as a pesticide when someone markets for the first time a material that increases the vitamins in tomatoes, makes clovers bear four leaves, makes crops resistant to frost, produces seedless watermelons or makes roses smell sweeter. ▲

Robert Z. Rollins is Chief of the Bureau of Chemistry in the California State Department of Agriculture. This article was presented as a paper entitled "Fertilizer or Pesticide?" at the Sixth Annual California Fertilizer Conference, April 14, 1958.

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There is a growing demand for a higher nitrogen content in mixed fertilizers. This year, you are in a better position than ever before to supply this demand at a good profit. Nitrogen Solutions are selling at a low price. And the new, improved ARCADIAN® Nitrogen Solutions make it easy and practical to produce high-nitrogen fertilizers in regular mixing equipment.

More Nitrogen from Solutions

Many fertilizer manufacturers are now ammoniating normal superphosphate to a ratio of one unit of N for each two units of P_2O_5 with all the nitrogen from ARCADIAN Nitrogen Solutions. They are able to obtain about half this ratio in triple superphosphate without the use of acids. Where a combination of normal and triple superphosphates is used in formulation, a ratio of one N to two P_2O_5 is easy to obtain by the use of small amounts of sulfuric acid.

This year it will pay you to ammoniate your superphosphate with all the nitrogen it will carry. For example, you may find it profitable to produce 6-12-12 fertilizer rather than 4-12-12 fertilizer. Either of these fertilizers can easily be produced with all the nitrogen from ARCADIAN Nitrogen Solutions.

Low Extra Cost

The only extra cost of the 6-12-12 over the 4-12-12 is the delivered cost of two units of nitrogen in ARCADIAN Nitrogen Solutions. On this basis, it will pay you to figure out how much more profit you can make by producing and selling the higher nitrogen fertilizer. Increasing the nitrogen content of your

(Continued on following page)

(Continued from preceding page)

fertilizer involves proper selection of the Nitrogen Solution that is adapted to your methods, materials, equipment and the formulas you wish to produce. There are Solutions to fit your needs in the big line of ARCADIAN Nitrogen Solutions. Get the advice of a Nitrogen Division, Allied Chemical, technical service man.

He will tell you how to produce high-nitrogen fertilizers with maximum amounts of nitrogen from Nitrogen Solutions, whether you produce pulverized or granulated fertilizers. He is familiar with the techniques involved in producing all grades of mixed fertilizer, including 1-2-2, 1-1-1 and 2-1-1 ratios.

Greater Profits

At the present low price of Nitrogen Solutions, this is an opportune time for you to take advantage of the trend toward higher nitrogen fertilizers. State colleges are recommending more nitrogen in fertilizers. Farmers are more familiar with the benefits of such fertilizers than ever before.

Production of high-nitrogen mixed fertilizers will enable you to supply a bigger share of your customers' total plant food needs with mixed fertilizers. You will be diverting business from straight materials into more profitable mixed fertilizers. Compare your profit per unit of nitrogen in straight materials with your profit per unit of nitrogen in mixed fertilizers.

When you balance your mixed fertilizer with adequate nitrogen to meet crop requirements, you increase the farmer's profit, your dealer's profit and your own profit. You put a greater dollar volume of tonnage through your plant and save money in storage and shipping costs per unit of plant food. You help your dealer to supply the farmer with his plant food needs in a one-sale one-package deal. This builds exclusive customers and repeat sales.

Ask Nitrogen Division

For the 1958-59 fertilizer year, plan now to produce and sell a bigger tonnage of high-nitrogen mixed fertilizers. For technical help on the production of these fertilizers, contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y. This service is available to customers without charge.

For years we have suspected that fertilizer use is related in some way to crop disease and insect problems. USDA tests at Beltsville now show that insects are easier to kill on properly-fertilized plants.

Technical Tips

PUT HEAT TO WORK for Better Granulation

Many fertilizer manufacturers find that the best granulation is achieved by controlling reaction heat so that the temperature of the mass is higher than 200°F as it leaves the ammoniator. They feel that the results are well worth the extra cost and effort involved. For example, in this method, sulfuric acid—which reacts with about twice as much heat as does superphosphate—is used in much greater quantities than would be required for neutralization alone.

Within practical limits, raising the temperature level brings the mass to granulation with less water content. The earliest point in most granulating processes where heat can be substituted most effectively for water is in the ammoniator. Thus, the ammoniator—in addition to conditioning—can deliver the mass to the dryer at higher temperatures and lower moisture content. This, in turn, lessens the load on the dryer.

Nitrogen Division, Allied Chemical, supplies several nitrogen solutions that raise heat in the ammoniator, as well as several that hold temperatures to the lower levels that some producers prefer. Make your own choice of granulation processes, but be sure to follow time-tested principles that always have resulted in the safe, efficient use of ingredients for higher rates of ammoniation.

Demonstration Sells Pasture Fertilizer

Often a simple demonstration on a small acreage is the best way to convince a farmer that it pays to use plenty of fertilizer. For example, one Indiana farmer is now buying a lot of pasture fertilizer because a fertilizer company agronomist placed a demonstration on the farmer's pasture last spring.

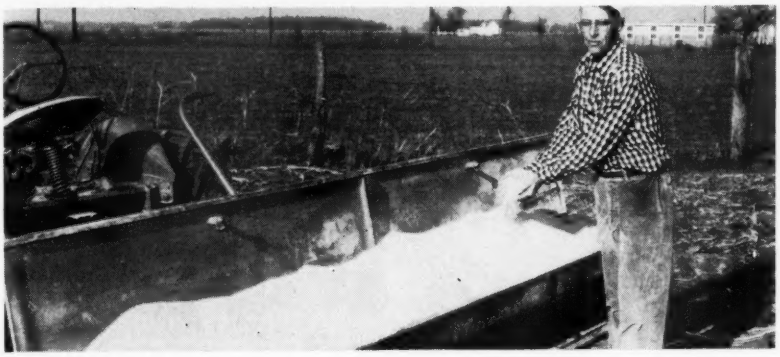
On May 23rd, 100 pounds of nitrogen per acre was spread on a test area of the pasture. By June 20th, the nitrogen top-dressed sod had produced 9¾ tons of green feed per acre, containing 3,800 pounds of dry weight averaging 22% protein. His unfertilized grass averaged 4½ tons of green feed per acre, containing 1,800 pounds of dry weight averaging 15% protein.

In one month, an investment of $12 for nitrogen top-dressing produced 2,000 pounds more dry weight and 566 pounds more protein per acre. This big return, within one spring month, sold the farmer on pasture fertilization.

As a result, he tested his soil and now uses complete fertilizer on all of his pasture. With the help of fertilizer, he was able to reduce the size of his pasture from 110 acres down to 80 acres. With fertilizer, the 80 acres now supply 130 head of cattle all the good green feed they can eat. He now estimates that fertilizer will produce two to three extra tons of dry weight per acre for the whole season, in addition to greatly increasing protein content.

Thus a simple demonstration made a good customer out of a farmer who never believed in pasture fertilization until he saw what it would do on his own farm. Demonstrations pay fertilizer men and farmers.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION



It Pays to Make Fall a Big Selling Season

If the present trend toward spring and fall use of fertilizer continues, the industry may soon be solidly established on an efficient two-season basis. Producers will be able to apportion production, sales and deliveries over the entire year rather than concentrate on a few hectic months followed by relative inactivity. Aside from the increased tonnage sold, the resultant economies of time and labor cannot help but benefit the fertilizer manufacturer.

In the past, small grains, pastures and vegetables have accounted for most of the fertilizer sold in the fall. But in recent years farmers have been using fall fertilizer on more and more cropland.

The Soil Stores for the Future

Farmers are coming to realize that many soils will hold plant foods over the winter. Retention of phosphorus and potash has always been excellent. And, except for sandy soil in heavy rainfall areas, nitrogen storage in the soil is also practical where winters are cold. In fact, it is becoming commonplace to use high-nitrogen fertilizers for fall plowdown of crop residues, and on sod, cover crops and small grains.

Makes for Better Farming

Virtually every crop can benefit from fall fertilization. Most corn land would be improved by use of fertilizer in fall plowdown. Agronomists even advise fall application of phosphate-potash mixtures on land to be planted in cotton and sugar beets–especially where there is a cover crop. With alfalfa, fall application of fertilizer high in phosphate and potash helps maintain thick stands and contributes to profitable yields. There are also many fruit crops that benefit from fertilization in the late fall.

It is the opinion of experts that fertilizer should be spread on hayland and pasture in the North during late fall, so that plant food will be stored in the roots for an early spring start. The oats, wheat, rye and other grazing crops of the South need heavy fall fertilization to provide pasturage along with a profitable grain crop. In other winter grain areas, using all the fertilizer in the fall produces as big a yield as would be obtained from split or spring application.

Fall, with its dry ground and slack time is the ideal time for spreading fertilizer by truck or some other simple, fast, low-cost method. Conversely, spring, with its labor shortage and pressure of activity is a less favorable time to plow down fertilizer.

Big Future for the Industry

Fall fertilization has been adopted by thousands of leading farmers. News of their excellent results attracts new converts every year, but producers can do much to accelerate the process and reap the bigger profits just over the horizon. Think of the tremendous potential fall market in just the corn, small grains, vegetables, fruit, pasture and hay crops now grown on soil that could use fertilizers in the fall. Get closer to *your* share of it by aggressive promotion of fall fertilizers. Why not start now!

Agronomic Notes

If every field on every farm had a test strip where the crop was fertilized according to experiment station recommendations, your dealers and salesmen would be too busy selling fertilizer to organize a field day.

Lacking this ideal demonstration situation, the tissue test kit still gives your men a graphic way to dramatize the need for fertilizer in any field right now. Quick chemical tests on the tissue of the growing crop show in minutes whether the plant contains enough fertilizer elements for good growth and yield.

True, you'll sell more fertilizer immediately only where the crop can be top-dressed, or where the farmer has an irrigation system. But the tissue test is a vivid reminder. Most farmers who see it use more fertilizer either right away or in the next season.

Almost every farmer has used some fertilizer. A profitable way to translate this fact for action is the saying "using a little fertilizer is like flying on one wing." When we show people the value of fertilizer, we do best by showing the value of plenty of fertilizer.

"Double* and *nothing" is a good rule to follow in planning fall pasture fertilizer demonstrations right now. If 500 pounds of fertilizer per acre is the recommended amount used on the field, one strip should get 1,000 pounds of fertilizer and one strip should get none.

Heavy rains on the eastern seaboard have leached away much nitrogen and magnesium. Rutgers University reports that up to 75% of the nitrogen and magnesium applied before Easter has disappeared from the fields, and 50% of these nutrients were lost from fertilizer applied up to May 4. They recommended an additional 50 to 75 pounds per acre of nitrogen for potatoes and 25 to 50 pounds for vegetables.

A long-lasting, slowly-soluble form of nitrogen such as ureaform in mixed fertilizers helps prevent such a situation. Mixed fertilizer made with N-dure® solution and urea provides this lasting ureaform nitrogen. Other nitrogen materials provide quickly available plant food. Your mixed fertilizers made with N-dure feed crops well even if heavy rains come so late in the season that side-dressing is impossible.

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

Other ARCADIAN® Products: N-dure® • UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

Allied Chemical

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Columbia 1, S. C., 1203 Gervais St.....Alpine 3-6676
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Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
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San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

READER SERVICE

FC

FREE INFORMATION to help you solve fertilizer, pesticide problems

Chemicals

193—NACCONOL

There are fourteen physical forms of Nacconol to meet your production requirements, reports National Aniline Div., Allied Chemical Corp. As a wetting agent, it is said to give liquid preparations improved coverage and sticking power. As a conditioner for dry mixes, it helps to reduce caking and to promote freer flow, says Allied Chemical. For complete information

CIRCLE 193 ON SERVICE CARD

194—NIAGARA TEDION

A detailed brochure for research workers interested in Tedion is available from Niagara Chemical Div. of Food Machinery and Chemical Corp. A miticide, Tedion chemically is 2,4,5,4′ tetrachlorodiphenyl sulphone. It is said to be especially effective in the control of tetranychid species of mites. For a copy

CIRCLE 194 ON SERVICE CARD

195—SOHIOGEN SOLUTIONS FOR LIQUID FERTILIZERS

"Sohiogen Nitrogen Solutions for Liquid Fertilizer Manufacture" is the title of a new book published by Sohio Chemical Co. Beginning with a definition and history of liquid fertilizer, the book discusses how liquid fertilizers are made, chemical and physical properties, handling nitrogen solutions, and safety. A list of Sohiogen products and individual product information sheets also are included. To secure a copy

CIRCLE 195 ON SERVICE CARD

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- **Clip and mail the Service Card.**

196—FORMULATION WITH EMCOL EMULSIFIERS

Emulsol Chemical Corporation has just published "Pesticide Formulation with Emcol Emulsifiers," which the company describes as a "full use data handbook." Emulsol says it has a double-barrelled approach to help pesticide formulators—"versatile emulsifiers of unsurpassed quality for top performance" and "full use data based on both laboratory experience and actual field tests." For your copy of the handbook,

CIRCLE 196 ON SERVICE CARD

Process Equipt.

197—COMPLEX FERTILIZER

Title of a new brochure from The Chemical and Industrial Corp. is "Complex Fertilizer." It describes the Spherodizer Process, a system for pelletizing slurries. The process differs from other pelletizing methods in that pellet formation and drying are carried out continuously by spraying the slurry into a falling curtain of material in a rotating drum in a hot stream of air and combustion gases. A flow sheet is included. For your copy,

CIRCLE 197 ON SERVICE CARD

198—CONICAL DRYER BLENDER BOOKLET

Pfaudler Co. reports that its new glassed-steel conical dryer blender introduces a new dimension to dryer blender equipment—versatility of application. In a single operation it can also impregnate, concentrate, react or coat. The glassed surface is corrosion resistant, and will handle any acid, except hydrofluoric, even at elevated temperatures, and most alkalies at moderate temperatures, says Pfaudler Co. The dryer blender is described in a bulletin, which you can have by

CIRCLING 198 ON SERVICE CARD

199—FLOWMETER HANDBOOK

New 15 page Variable-Area Flowmeter Handbook from Fischer & Porter Co. gives basic engineering data including tables, graphs and equations for application, sizing and flow rate calibration prediction of low flow rate rotameters. For a free copy,

CIRCLE 199 ON SERVICE CARD

200—ROTARY BATCH MIXER-BLENDERS

Several models of rotary batch mixers, that will mix materials of varying specific gravities and minute or trace quantities, are described in a four-page specification sheet from Munson Mill Machinery Co. The mixing principle is fast, accurate blending without reduction of particle size of ingredients that are tumbled, turned, cut and folded, the company says. One will be mailed to you if you

CIRCLE 200 ON SERVICE CARD

Packaging

201—THE KRAFTPACKER

Kraft Bag Corp. reports that its Kraftpacker open mouth bag filling machine requires a low investment and maintenance cost. It can handle free-flowing material and gives its user higher production and greater accuracy, Kraft says. They'll be happy to send you details if you

CIRCLE 201 ON SERVICE CARD

202—VALVE BAG PACKER

E. D. Coddington Mfg. Co. reports that its Airpac valve bag packer fills bags quickly and accurately by the use of a small amount of low pressure air. The scale, built in the machine, stops the packing operation when the bag is filled to the correct weight. Advantages claimed for the bagger are: no moving parts, gentle packing action, low operating cost, quiet operation, versatility and dependability. For details,

CIRCLE 202 ON SERVICE CARD

203—MULTIWALL BAG PRINTER

A new, automatic machine for inplant imprinting multiwall bags was recently announced by Industrial Marking Equipment Co. of Brooklyn, N. Y. Claimed to eliminate pre-printing and bag obsolesence and to simplify inventory, the unit feeds and prints up to 20 multiwall bags per minute. It is intended for use with production line filling equipment. Complete details are available.

CIRCLE 203 ON SERVICE CARD

204—INVENTORY BELT SCALE

A new totalizing inventory belt scale that recalibrates linearly has been developed by the Thayer Scale Corp., and is now

operating in systems conveying ores, chemicals and other materials. Thayer guarantees the plate leverage system accurate for the life of the scale. They claim that "neither dust nor dirt, shock nor vibration can affect its high accuracy." Scales with capacities of 100 pounds to 300 tons per hour are available. For further information

CIRCLE 204 ON SERVICE CARD

Materials Handling

205—BUYING GUIDE FOR "WALKIE" TRUCKS

A comparison chart is available free from Lewis-Shepard Products, Inc. The chart lists some 30 points of comparison for both high-lift and low-lift "walkies," which are electrically-powered trucks operated from a control handling while walking along with them. With the chart, Lewis-Shepard says the potential purchaser is able to note in spaces provided the various characteristics of each truck he is comparing, and then weigh the features of the trucks. For your chart,

CIRCLE 205 ON SERVICE CARD

206—NEW BALL BEARING TROLLEY BOOK

Ball bearing trolleys and how they work in maintaining the efficiency of trolley conveyors are described in detail in a book just published by Link-Belt Company. It contains 20 pages of specific data on the types and sizes of trolleys available, selection of new trolleys and attachments, and the replacement of units in existing installations. Maintenance information also is included. Copies are available by

CIRCLING 206 ON SERVICE CARD

207—TIERING TRUCK

"Raymond 4-D", a new bulletin of Raymond Corp., pictures and describes the company's new four directional electric tiering truck designed to transport long loads through a wide main aisle and move sideways into a narrow storage aisle. For your copy of the bulletin including complete specifications, suggested applications and photos showing the truck in use, just

CIRCLE 207 ON SERVICE CARD

208—NEW TRACTOR SHOVEL

A 20-page, two-color brochure on its Y-18 Industrial Tractor Shovel is available from The Yale & Towne Mfg. Co. The tractor shovel is designed to perform 25 per cent more work than comparable models, Y&T claims. Features discussed in detail are the automatic Yale torque transmission, safety curve arms, 45 degree bucket tip back and six foot high dumping clearance. Two pages are devoted to maintenance features of the unit. To obtain a copy,

CIRCLE 208 ON SERVICE CARD

Miscellaneous

209—COLE TANK BOOKLET

"Tanks and Equipment for the Plant Food Industry" is the name of a booklet being offered by Cole Manufacturing Company. This booklet gives information on welded aluminum tanks in all sizes and types for nitrate solutions. You can obtain a free copy by

CIRCLING 209 ON SERVICE CARD

210—SEVEN WAYS TO CUT COSTS

"Seven Ways to Cut Costs" is the title of a special booklet recently published by The Frank G. Hough Co. The booklet demonstrates the utility value of interchangeable front end attachments on Payloader tractor-shovels, Hough states, and photographs place all seven attachments on one basic machine. Action pictures demonstrate the material handling assignments that can be made to apply to each attachment. Condensed specifications for the HA and HAH Payloaders also are included. Free copies are available if you

CIRCLE 210 ON SERVICE CARD

211—THREE-IN-ONE CATALOG

A consolidated catalog is available for three products made by the Bin-Dicator Co. for bulk material, level indication and control. The catalog includes photographs, cutaway and schematic drawings, outline dimensions, general specifications, special bin and conveyor applications, actual and suggested systems and applications for the Bin-Dicator, the diaphragm type bin level indicator; Roto-Bin-Dicator, rotating paddle type bin level indicator; Bin-Flo Aerator, to promote flow of dry, finely ground bulk materials. If you'd like a copy,

CIRCLE 211 ON SERVICE CARD

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212—DATA PROCESSING

Features, applications and specifications of the model 123 data processing system are provided in a four-page bulletin from Beckman Systems Div. The system is reported to be ideally suited for process plants, power plants, pilot operations or wherever variables such as temperatures, pressures, flows, etc., are to be recorded. For a copy of the bulletin,

CIRCLE 212 ON SERVICE CARD

213—TOP-STIRRED REACTION VESSELS

Two new top-stirred reaction vessels have been developed by American Instrument Co., Inc., for conducting chemical reactions between liquids; liquids and gases; or solids suspended in liquids. Reactions may be conducted under extremely high temperatures and pressures, the manufacturer says. Heating of the vessel contents is by electric heaters positioned in two banks around the periphery of the vessel, allowing temperatures up to 1000° F. to be obtained. Complete information is contained in a new catalog available by just

CIRCLING 213 ON SERVICE CARD

214—TANK LININGS FOR THE FERTILIZER INDUSTRY

Cold-set tank lining materials for use by the fertilizer industry are being manufactured by Wisconsin Protective Coating Co. A condensed technical bulletin includes information and prices. To get it,

CIRCLE 214 ON SERVICE CARD

215—EFFICIENCY RECORDER

A tool for management, engineers and operators, the Efficiency Recorder shows the "on" or productive time as well as the "down time" of continuous production processing machines, reports Gorrell & Gorrell. The recorder is compact, automatic and uses an inkless recording system, claims the manufacturer, and data is given continuously at very low cost. For details,

CIRCLE 215 ON SERVICE CARD

See pages 51, 52 and 54 for information on these Reader Service Numbers:

216—Optical Analysis
217—B-5 Bag Closer
218—Vibrating Feeder
219—Myers Sprayer
220—Foamsil
221—Stoker Settler
222—S.S. Relief Valve
223—Print-A-Can Printer
224—Dehumidifier
225—Chemagro CO-RAL

THE MAN WITH THE MULTIWALL PLAN

UNION PACKAGING SPECIALIST HENRY SCOTT

simplifies packer's inventory –trims costs by $42,000

"How can we get more out of our Multiwall dollars?"

The question, put by a Southern packer to Union Packaging Specialist Henry Scott, led to a complete analysis of the company's bagging operation. The analysis in turn produced three important recommendations. And $42,000 annual savings!

Union Multiwall Recommendations are based on this 5-Star Packaging Efficiency Plan

- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Working through Union's 5-Star Packaging Efficiency Plan, Scott reduced the size of one bag. The shorter Multiwall gives firmer packing and neater stacking. Further package engineering enabled the company to reduce its range of Multiwall bag styles and sizes by 30 per cent!

Union's Art Department also created a family of high-recognition designs for the firm's existing products. And finally, a brand new design which will help launch 400,000 tons of new product to be marketed this year.

Perhaps Union's 5-Star Plan can help unearth a money-saving idea for you. Perhaps several. Worth looking into, wouldn't you say?

Better Multiwall performance through better planning

union camp ®

UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

FOREIGN AID CREATES NEW MARKETS FOR PESTICIDES

A plant protection official of the government of Afghanistan tells farmers how to control locusts (grasshoppers) with a modern insecticide. USDA entomologists train personnel to control major crop pests, and the International Cooperation Administration of the U. S. Department of State furnishes funds for this technical assistance. USDA Photo.

A LITTLE-KNOWN aspect of U. S. foreign aid —the technical assistance in insect control given to countries of the Middle East, South Asia and Africa—is paying off in world-wide plant protection and new markets for U. S.-produced pesticides and applicating equipment.

Seven years (1951–57) of this work in 13 countries have demonstrated its value in helping to combat hunger, malnutrition and poverty through controlling crop pests.

Time-payment plans have made it possible for small growers to buy much of their own pest-control equipment. In the past seven years, these countries have imported 93 spray airplanes, 326 trucks, 1,129 power applicators, 19,826 hand applicators and 643 other pieces of pest control equipment. For use with this equipment they have bought 3,777 tons of some 50 different agricultural pesticides, largely from the U. S.

The work has strengthened plant-protection organizations in the 13 countries, resulting in a general advance of entomological research and the establishment of effective plant quarantines and pest-control programs.

Knowledge gained in the programs has helped to arm farmers everywhere against possible foreign pest invasions of the future. Pyrilla of sugar cane, senn pest of wheat, the spiny bollworm of cotton, the date leafhopper, the olive fly and many other pests not found in the U. S. are now under study and attack in the Middle East.

As financial support by local governments in these areas has increased, the need for U. S. dollar support for pest-control assistance in these countries has dropped off. Today the countries benefiting from the program put $13 of their own money into this work for every $1 spent by the U. S.

The International Cooperation Administration furnishes funds, and USDA carries out the "here's how" insect-control program. U. S. assistance is withdrawn as soon as enough key local people in a country are trained to carry on their own insect-control and plant-protection work.

Nine entomologists, a plant-quarantine specialist and four airplane pilots of USDA's Agricultural Research Service are now at work in eight countries—Afghanistan, Ethiopia, Iran, Iraq, Lebanon, Libya, Pakistan and Tunisia. Assistance has been given previously to Egypt, India, Jordan, Morocco and Turkey. Leadership in locust control measures (largely ground operations) is being provided to Saudi Arabia and other countries under the United Nations technical assistance program.

In the first year of the U. S. program (1951), a USDA entomologist worked in three countries on the desert locust, supervising work to which the U. S. contributed $567,000. In 1957, nine American technicians worked in 10 countries on dozens of insect pests at a cost to the United States of about $300,000.

Since 1951, USDA's technical assistance workers assisted in demonstration projects under which almost 400,000 acres have been treated with insecticides to show foreign agricultural leaders and farmers how to combat 85 different insects attacking 37 crops.

The USDA workers have demonstrated insect survey techniques, insecticidal seed-treatments, methods for controlling weeds and stored-grain and livestock pests, and cultural practices that cut insect numbers. They have trained almost 300 plant-protection technicians, 83 airplane pilots and 65 airplane mechanics. Thirty plant-protection trainees have been sent to the U. S.

By working together to fight winged insect enemies, the countries have demonstrated the value of mutual aid, exchange of information and development of advanced techniques in pest control. ▲

HOW TO GET THE MOST FOR YOUR FERTILIZER MACHINERY DOLLAR

Before You Buy, Check Sturtevant's Answers to These Key Questions

Q - How much experience is built into the design?

A - You get the benefit of 84 years of practical fertilizer industry experience in each Sturtevant machine you buy. Unrivaled for fertilizer plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

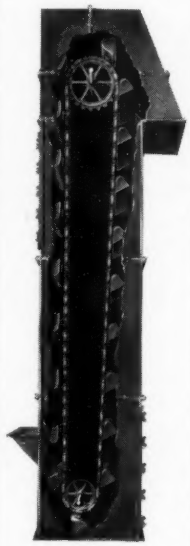
Q - Is the machinery engineered for peak-load efficiency?

A - All details in each Sturtevant machine have been proved by years of peak-load performance in fertilizer plants. Rugged construction that withstands the most slam-bang use, gears designed to always perform dependably, bearings that stand up under the heaviest loads, all can be taken for granted in Sturtevant machinery. Many Sturtevant machines have been operating at top capacity and efficiency for well over a quarter of a century.

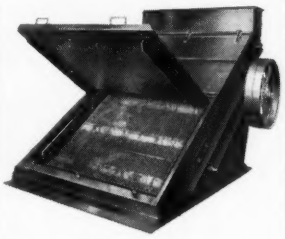
Q - How accessible is the machinery for clean-outs and repairs?

A - Clean-outs are a constantly recurring problem in the operation of a fertilizer plant. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute".

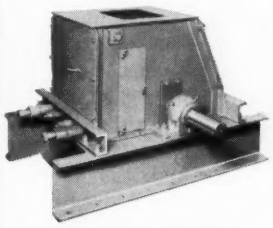
For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your fertilizer unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, 140 Clayton St., Boston 22, Mass.



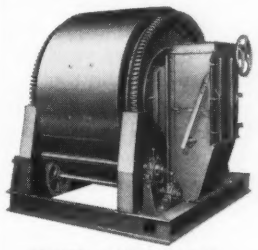
ELEVATOR



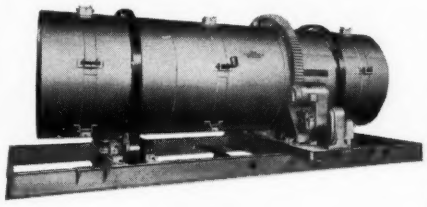
B-B SCREEN



ROTARY PULVERIZER



MIXER - AMMONIATOR



GRANULATOR

COMPLETE GRANULATION PLANTS
MIXING and SHIPPING UNITS
DEN and EXCAVATORS
CONVEYORS
FEEDERS and OTHER ACCESSORIES
MICRON GRINDERS
AIR SEPARATORS
CRUSHERS and GRINDERS

For further information, write Sturtevant today.

STURTEVANT MILL CO.

Dry Processing Equipment

The "OPEN-DOOR" to *lower* operating costs over *more* years

How Would You Decide?

FC

Beginning in this issue a monthly roundup of day-to-day employee problems and how they were handled by management. Each incident is taken from a true-life grievance which went to arbitration. Names of the principals involved have been changed.

When Can't You Fire Employees For Stealing?

What Happened:

Four employees were suspected of stealing small tools. The company reported it to the Deputy Sheriff and asked him to interrogate the workers involved. While questioning them, the Sheriff promised the suspects that if they would return the tools, and confess, the company would not impose any serious penalty. The workers brought the tools back—and were promptly fired by the management. The workers took their plea to arbitration, stating:

1. We were promised leniency, and instead, we got the axe.
2. The stuff we stole were small items, and we didn't resell them to make money.
3. The company has previously been "forgiving" to others who have taken off with tools for their personal use.
4. Don't brand us "thief" for such a small violation.

The company stood its ground on the basis that regardless of the size of the loot, stealing is a dischargeable offense.

Was The Company:
RIGHT ☐ WRONG ☐

What Arbitrator Wilber C. Bothwell ruled:

"It is clear that discharge may be justified as a penalty for stealing, even when, as is the case here, it is a first offense. Theft is a very serious offense, and mutual confidence and trust are important in the relationship between employer and employee. Discharge has been sustained as a penalty for theft in many arbitration cases. The company has stated its policy to be to discharge an employee in a clear case of theft, even in the case of a first offense. The arbitrator must reject the contention of the union that the taking of small items from the company, for personal use of the employee, constituted a defense. Except for the promise of immunity from prosecution, which apparently secured the confessions, the arbitrator can find no serious objections to the action of the company, and would sustain the discharges. However because of this promise, and the fact that none of the employees had any previous discipline on his record, the arbitrator finds that the discharges were not for proper cause. The employees will be reinstated, but without back pay."

Must You Supply Parking Space for Workers' Cars?

What happened:

When the police department started cracking down on street parking, and gave out lots of tickets, the employees of the company demanded that they be provided with a parking area inside the plant gate. In fact, they went ahead and filed a grievance to that effect. The management refused to process the grievance on the grounds that the demand for parking space had nothing to do with wages, hours or working conditions. To prove its point, the company agreed to have an arbitrator decide the matter. The employees claimed that their wages were affected because when they had to pay parking fines, their "take-home-pay" was less. They also claimed that their safety was in jeopardy because congested streets outside the plant made crossing into the plant hazardous.

Were The Employees:
RIGHT ☐ WRONG ☐

What Arbitrator Mitchell M. Shipman ruled:

"Without minimizing it one iota, the arbitrator must dismiss the grievance. As the company correctly points out, he has no jurisdiction in the matter. He can only act where the Agreement establishes an obligation upon the company. Where, as here, the Agreement does not make it obligatory upon management to take the particular action which the union is seeking, the grievance then stands without Agreement support and must be dismissed. The umpire has not overlooked the safety or hazard argument which was urged by the union. To be sure, management has the obligation to maintain safe working conditions for its employees. This obligation is, however, confined to the conditions of work within the plant. Conditions which prevail outside the plant, however much they may be related to the physical and mental well-being of the employees (and parking may well be one of those conditions) are, nonetheless, not truly within the scope of the safety maintenance obligations of the company under the Agreement."

For Refusing To Work Scheduled Overtime, Can An Employee Be Fired?

What Happened:

During the busy season, it was the practice of the company to schedule Saturday as an overtime day, and employees were expected to come in on those days. The union contract provided that employees would be required to work a reasonable amount of overtime. Suddenly, Mrs. Anthony started being absent on Saturdays, claiming that she couldn't come in because of family responsibilities. She was warned twice, and when she persisted in being absent, she was fired. The union, representing her at the arbitration, claimed that overtime is a voluntary act, and employees cannot be disciplined for refusing to put in extra hours. The company rested on its management right to schedule the hours of work, and that such right included the requirement that employees put in reasonable overtime.

Was The Company:

RIGHT ☐ **WRONG** ☐

What Arbitrator James C. Hill ruled:

"The company has an unlimited right to schedule hours, including a longer or a shorter week than the usual 40 hours. Further, the right to schedule longer hours has quite generally been held to carry with it the right to require performance of overtime work. If management is empowered to schedule the working hours, it must follow that management may require performance of the work. While occasional refusals by employees may be tolerated, and efforts may be made to accommodate individual convenience and choice, the employee cannot consistently refuse to accept overtime work. Mrs. Anthony's discharge was for just cause."

If An Employee Resigns Can He Change His Mind And Get His Job Back?

What Happened:

Mr. Dusa came up to his supervisor one day and said: "I just found another job for more pay. I'm giving you two weeks' notice." The supervisor replied: "I'm sorry you're leaving. I hope you will be happy there. By the way, why don't you put your resignation in writing so I'll be able to clear things with the payroll department." Dusa did this. A week later Dusa changed his mind, and asked to have his letter of resignation rescinded. The company refused on the grounds that Dusa had resigned and could not claim his job back without management's consent. Dusa argued differently:

1. A letter of resignation is not effective until the "notice date" expires. My letter still had three more days to go.
2. The company did not replace me, nor did it post my vacancy, so it lost nothing.

Was Dusa:

RIGHT ☐ **WRONG** ☐

What Arbitrator Harry J. Dworkin ruled:

"In this case, the evidence raises no doubt but that the grievant tendered his resignation, and the notice given to the company was intended to convey the employee's intention to sever his relationship. The company did 'accept' his resignation. The employee having quit his job, the attempted reversal cannot be unilaterally made. The arbitrator views this case as one of simple and voluntary resignation. The grievance is denied."

Letters

Baltimore, Md.

Didn't know whether to laugh or cry after looking at my outstanding feature on page 27 of your July issue. Talked it over with my attorneys and they said no, don't sue, just take the attitude that it doesn't matter what they say about you, just so you keep them saying something.

. . . what I would like to have is the negative, as I want to have some enlargements made of my posterior for my posterity. In addition to the razzing from my own associates, several letters have come in from readers, which should make you feel good as evidence of reader interest.

Sincerely yours,
J. S. WHITTINGTON
Director of Wholesale Sales
Olin Mathieson Chemical Corp.

The negative is yours. Ed.

Washington, D. C.

Just wanted to say thanks for the splendid job you did in covering the Convention. We appreciate . . . the fine job of reporting the program and other activities.

Sincerely yours,
MOYLE S. WILLIAMS
Chief Agricultural Economist
National Plant Food Institute

Washington, D. C.

I was especially pleased to see the article "Highway Roadside Spraying" by H. Ingerson in the May issue of FARM CHEMICALS. Mr. Ingerson's article was very informative and well illustrated.

We have sent reprints of similar articles to highway administrators, landscape architects, etc., throughout the U. S. and I think Ingerson's article merits similar distribution. . . .

Yours very truly,
JACK DREESSEN
National Agricultural Chemicals Association

Torrance, Calif.

. . . This July issue with the Ag-2 on the cover is most timely for us. In June we received our C.A.A. Certification under Part III Regulations . . . the qualification under Part III means that the Ag-2 is a safe airplane to fly by any licensed pilot, can carry passengers, do any type work and is eligible for import into most foreign countries. Practically all other Ag aircraft, old and new, are licensed under Part VIII which restricts the use of the aircraft to ag work, requires qualified pilot and can be imported into relatively few countries.

So with this certification in hand we are now ready to go into full production. . . .

Sincerely,
JOHN T. HALES
Advertising Manager
Transland Aircraft

Washington, D. C.

We wish to congratulate you on your fine roundup on agricultural planes in the July issue. It is a good job on a difficult subject. . . .

Sincerely,
ROBERT E. MONROE
Asst. Executive Director
National Aviation Trades Association

MISSISSIPPI CHEMICAL BUILDS NEW PLANT

Missiissippi Chemical Corp. will build a new plant in Yazoo City to make solid urea and high nitrogen liquid fertilizers for direct application, MCC President C. S. Whittington has announced. The plant will provide about 100 tons a day of solid urea in addition to the liquid plant food.

The $2 million expansion program brings MCC's plant investment at Yazoo City to about $20 million, the company said.

FERTILIZER PLANT OPENS, SETS LOCAL AFRICAN MARK

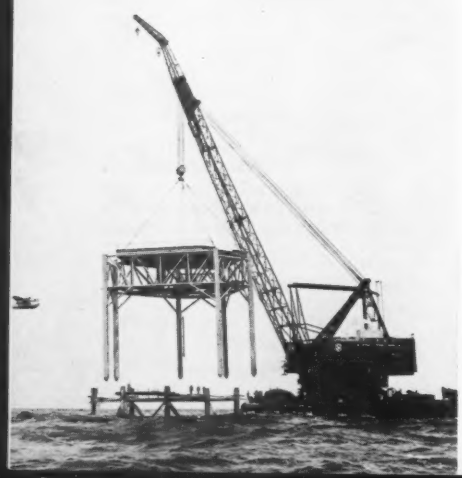
A new plant for the manufacture of mixed fertilizer, sulfuric acid, phosphoric acid and normal and triple superphosphate recently went into production near Salisbury, Southern Rhodesia. The plant is reported to be the largest chemical plant in British Central Africa—with an estimated cost so far of $10½ million.

Built by African Explosives and Chemical Industries (Rhodesia) Ltd., the plant was financed jointly by the British Imperial Chemical Industries combine and De Beers, the South African mining group.

Most raw materials are expected to be available within easy transportation range of the plant.

FREEPORT ERECTS ISLAND

THE FIRST big steel structure of Freeport Sulphur Co.'s $30 million offshore sulfur mine is positioned at the site seven miles off the coast of Louisiana in 50 feet of water. A 172-ton deck section, which dwarfs workmen, is placed by a giant floating crane atop legs sunk deep into the Gulf floor. When completed, the Y-shaped island will be almost a mile long—believed to be the largest steel island in the world.



VICKERS DELIVERS BENZENE FROM NEW WICHITA PLANT

The first benzene ever manufactured in Kansas was delivered by Vickers Chemical Div., Vickers Petroleum Co., Inc., to the Wichita plant of Frontier Chemical Co., in June. The benzene was manufactured at Vickers' new $3,500,000 petrochemical plant located in Potwin, Kansas. Frontier, which merged with Vulcan Materials Co. on Jan. 1, will use the benzene in the manufacture of benzene hexachloride.

"This initial transaction represents the combined efforts of two industries toward a common goal: the expansion of industrial and agricultural Kansas," said J. A. Vickers, president of Vickers Petroleum. "In this instance, two companies which manufacture widely divergent basic products are collaborating to produce a commodity which is predicted to make a sizable contribution toward the prosperity of agriculture . . ."

Along with benzene, salable products manufactured at the Potwin refinery since the June 1 start-up of the Udex extraction unit included toluene, also of the reagent quality, xylene and Solvent V-100, Vickers trade name for a high flash point petroleum aromatic solvent.

SPENCER SELLS FERTILIZER IN GIANT PLASTIC SACKS

Spencer Chemical Co. says it is the first company to use a "giant" polyethylene bag in quantity. The company is introducing it as a container for its "Mr. N." ammonium nitrate fertilizer. "More than two years of development work have proven the bag to be a highly efficient container not only for ammonium nitrate (which requires special protection from moisture) but for many other materials," the company reports.

Among the tests used in proving that the bag could "take it" was one which involved tossing it from a truck going 30 miles per hour onto a rough asphalt pavement.

The plastic fertilizer bags turn water like a duck's back, says Spencer. And after they're emptied, they have many uses.

Spencer's fertilizer bag is simply a tube of polyethylene sealed at each end. The walls of the bag are 10 mil (10/1000 inch) thick—about five times as thick as the smaller polyethylene bags familiar as fruit and vegetable packages.

Among the suggested uses for the bag, when washed out after its contents are emptied: a storage bag to keep all types of material dry and free from contamination; when slit open to provide a 38 x 29–inch sheet: a "storm" window to help keep barns and other outbuildings weathertight. It can be used for lining ditches or facing small earthen dams to prevent erosion.

EIRE EXPERTS STUDY FRENCH NITROGEN INDUSTRY

After studying the nitrogen fertilizer industry in France, three Eire exports reported favorably to the Eire government on the possibility of establishing a nitrogen fertilizer industry in Ireland, *Fertiliser and Feeding Stuffs Journal* recently reported.

The *Journal* said that capital needed for the new industry will be about £6,000,000 (approx. $16,800,000), 40 per cent of which will be spent on capital equipment and preparation for the plant over a period of three years.

Fertilizers valued at £4,500,000 (about $12,600,000) a year are imported to Eire, and about half of this is spent on nitrogenous fertilizer. Irish farmers should be using three times their present consumption of fertilizer, the *Journal* reported, so "the market is undoubtedly there."

The plan was discussed 11 years ago, but there was doubt that the new industry would be a complete success. The government now is said to be fully convinced that the nitrogenous fertilizer industry will be economic and productive.

UREA PLANT PLANNED BY OLIN & SUN OIL

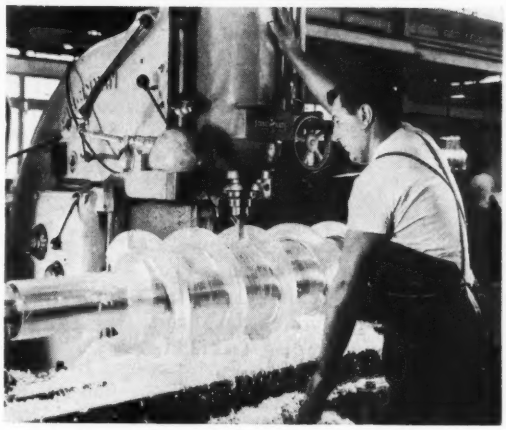
Letters of intent have been exchanged by Olin Mathieson Chemical Corp. and Sun Oil to form a joint company to build and operate a 73,000 ton-a-year urea plant, Stanley deJ. Osborne and Robert G. Dunlop, presidents of the two companies respectively, have announced.

Site for the proposed urea plant would be Marcus Hook, Pa., where Sun has one of the largest refineries in the U. S. including a 300 ton-a-day ammonia plant.

AP&CC MOVES LOS ANGELES HEADQUARTERS OFFICES

American Potash & Chemical Corp. has moved its headquarters offices into a newly constructed building at 3000 West Sixth St., Los Angeles. The three-story building has a total of more than 40,000 square feet of office space. All the company's executive offices will locate there.

PLEXIGLAS AUGER FOR CHEMICAL UNIT



A machinist at Chemineer guides a milling lathe on which a giant auger is being turned from a large single cylinder of Plexiglas.

What may well be the largest machine part ever made entirely of plastic was recently fabricated as a worm feed for a chemical production unit, Rohm & Haas Co. reports.

Specialty Equipment Div. of Chemineer, Inc., Dayton, Ohio, was commissioned to build a blender-feeder which would mix and transport viscous slurries. It was imperative for the proposed application that any possibility of metal or metal-alloy contamination be eliminated. Because it met all the chemical specifications, would easily withstand the mechanical operation itself and could be machined to the close tolerances required, Chemineer decided to make the unit of Plexiglas acrylic plastic.

Since Plexiglas does not come in stock thicknesses sufficient for an auger of the dimensions required (15″ diameter by 50″ long), engineers from Chemineer and from Rohm & Haas Co., makers of the plastic, solved the problem by laminating three-inch thick pieces. First, three-inch sheets were cut into disks a little larger than the required auger diameter. The flat surfaces of each disk were then machine faced to insure exactly parallel surfaces. These disks were next cemented together with PS-18, a Rohm & Haas solvent type cement, until the desired length of about 50 inches had been attained. This large single cylinder of acrylic plastic was then bored and keyed through its entire length, for the insertion of a metal shafting. After the shaft was installed, the unit was turned on a milling machine by special gearing attached to the horizontal table. When the final assembly was made, the auger cleared its casing by exactly 0.010″.

Engineers at Chemineer believe this first plexiglas blender-feeder may open the way for a new approach to the mixing, blending and feeding of corrosive, viscous or easily contaminated liquids or slurries.

AIKMAN FORECASTS DROP IN U.S. NITROGEN USAGE

While sales of nitrogen in the U.S. during 1957–58 will drop to 2,000,000 metric tons for agriculture and approximately 900,000 tons for industrial purposes, the world nitrogen market shows improvement Aikman (London) Ltd. estimates in its half-yearly report.

Production has been less than estimated, the report said, because of lowered steel production in the U.S.—falling at one time to 45 per cent of capacity, and some curtailment of other production when it appeared that the expected increase in consumption might not materialize.

Aikman pointed out that the price of nitrogen fertilizers a few months ago reached a low international level, but said that prices will now become slightly firmer for new transactions.

AAC MOVES NYC OFFICE

The American Agricultural Chemical Co. has moved its New York City office to the Twelfth Floor, 100 Church Street, Zone 7. Telephone: Barclay 7-1400.

FARM CHEMICALS

Business & Management

GRACE BUILDING TRINIDAD PLANT TO MAKE FERTILIZER

W. R. Grace and Co., in partnership with other investors has formed a new company, Federation Chemicals Ltd. The new firm began construction in May of a $12 million fertilizer plant at Point Lisas, Trinidad, B.W.I. Plans call for completion in the second half of 1959, with a daily capacity of 100 tons of ammonia, 200 tons of sulfuric acid, 245 tons of ammonium sulfate and 70 tons of urea. Grace is to have over-all responsibility for management and sales.

U. S. STEEL TO BUILD NEW PILOT PLANT

Full-scale experiments in measuring the recovery of gas and coal chemicals and in preparing and blending coal for coke ovens will begin shortly at U. S. Steel's Clairton Works with the building of a pilot plant, F. A. Dudderar, general superintendent, announced recently.

Improved techniques in the use of coke and coal chemicals and in coal preparation could be anticipated through use of the new facilities, Dudderar continued.

To be housed in a building now under construction, the coal preparation pilot plant will be equipped to operate at a maximum rate of 50 tons per hour. Raw coals will be received by rail or truck, prepared and conveyed to a 100-ton bunker which serves the experimental ovens.

FERTILIZER PRODUCTION IS EXPANDING IN BRAZIL

Brazil's output in 1956 of 109,000 metric tons of superphosphate and 6,769 tons of ammonium sulfate was 14 per cent ahead of the previous year's production levels in each case, according to the Business and Defense Services Administration, U. S. Dept. of Commerce. While figures for 1957 are not yet available, indications are that superphosphate was up about 15 per cent and ammonium sulfate about 8 per cent from 1956.

Three new facilities for production of nitrogenous fertilizers are under construction or planned, BDSA said. A plant at Minas Gerais is expected to begin production in 1958 with an annual output of 25,000 tons of calcium nitrate and 5,000 tons of ammonia. A petroleum refinery in Rio de Janeiro also is preparing to make 20,000 tons of ammonium-nitrate-lime and ammonia. The other project, which will be at Aratu, Bahia, is planned for 1960.

There are six plants making superphosphates, three of which are in the Sao Paulo area and account for 90 per cent of total capacity. Expansion of superphosphate capacity and production also is projected.

Despite the recent marked growth in production of phosphatic fertilizers, in 1956 106 tons of superphosphate, 119,000 tons of phosphate rock and 12,000 tons of other phosphatic materials were imported. Imports of nitrogenous materials, largely Chilean nitrate and ammonium sulfate, totaled 133,000 tons. Potash is not produced in Brazil and 66,000 tons were imported, mostly as potassium chloride. Other imports were 15,000 tons of mixed fertilizers, natural organic materials and unspecified materials.

It has been estimated that about 65 per cent of the fertilizer materials consumed in Brazil during 1956 were imported, over 50 per cent of which came from the United States. Germany, Chile and North Africa were other leading suppliers.

VICKSBURG, MISS. PLANT SHUT DOWN BY SPENCER

While Spencer Chemical Co. attempts to reduce its stockpiles, its Vicksburg, Miss., nitrogen plant has been shut down for an indefinite period, according to a recent report.

Weather conditions and intense growing competition were said to be the primary reasons for the surplus.

NEW CORPORATIONS

Ascension Fertilizer Co., Inc., Donaldsville, La., has been granted a charter, listing capital stock of $50,000.

Capital Products, Inc., Jackson, Miss., has been granted a charter to engage in the manufacture of insecticides. Authorized capital stock is listed as $125,000.

The Farm Chemical Corp., Bay Saint Louis, Miss., has been granted a charter to manufacture fertilizer, listing capital stock of $25,000.

BAG-SAVING IDEA FROM SWIFT MANAGER

BINS SAVE BAGS in loading fertilizer for aerial application on rice fields near Houston, Texas. S. B. Tatem, Houston branch manager of Swift and Co., developed the bins shown above. They are filled at the plant and loaded on the truck with a fork lift truck. In the field, the hopper used to fill the plane is set beneath the sliding door and the fertilizer runs into it. The bins hold enough for two plane loads. A boom with a front end winch is shown lifting the hopper above the M & M Air Service plane for loading.
Photo by Harry Hess

For uniformly conditioned mixed goods, use

Du Pont UAL-S

Here's how it works . . .

New Du Pont UAL-S permits you to take advantage of the well-known conditioning effect of sulfates in fertilizers. A small amount of ammonium sulfate added in a finely dispersed form as in UAL-S is equivalent to a much larger amount added dry to the mixture . . . ammonium sulfate means better, more uniform conditioning. All of your fertilizers will benefit from nitrogen derived from UAL-S, because it combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

Regular mixtures cure well with UAL-S, are free-flowing and resist caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well. UAL-S is non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum, and it's safe—handles at moderate pressure, and there's no danger of flash fires.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, fill out and mail the coupon.

PROPERTIES OF UAL-S

Nitrogen Content	42.5%
Freezing Point	20°F.
Pressure	15 psi at 60°F.
Specific Gravity	1.13
Fixed to Free Ratio	.9 to 1.0

Composition: Parts/100

Urea	38.8
Ammonium Sulfate	10
Ammonia	27.1
Water	15.1
CO_2	9.0

Du Pont UAL solutions in mixed fertilizers have helped American farmers grow better crops for 25 years.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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Dear Sirs: Please send me more information on UAL-S.

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FARM CHEMICALS

— *Business & Management* —

ALL U.S. FRASCH SULFUR MINERS IN EXPORT CORP.

Duval Sulphur and Potash Co. and Jefferson Lake Sulphur Co. recently joined Sulphur Export Corp., New York.

Formed by Texas Gulf Sulphur Co. and Freeport Sulphur Co., Sulphur Export now will handle overseas sales for all United States producers of sulfur mined by the Frasch process.

CENTRAL AND WESTERN FERT. COOPS CONSOLIDATE

Joseph J. Lanter, president of the Central Farmers Cooperative, has announced the expansion of the Central Farmers Fertilizer Co. of Montpelier, Ida., through a consolidation with the Western Fertilizer Association, which will add Pacific Northwest agricultural cooperatives to the Central Farmers organization.

The Central Farmers Fertilizer Company which is building a $14.5 million phosphate plant at Georgetown, Ida., is an interregional agricultural cooperative producing and distributing basic fertilizer materials to 22 regional agricultural cooperatives in the Mid-West and Pacific Northwest.

Charles M. Miller will supervise the company's mining, phosphate rock processing and finished product shipping activities. Miller as materials manager for the newly consolidated firm, also will coordinate the company's services to the new members resulting from the consolidation. These new members are Grange Cooperative, Utah Cooperative Association, Utah Poultry and Farmers Association, Pacific Supply Cooperative and Washington Farmers Cooperative Association.

HARRIS LABORATORIES BUYS LEXINGTON LABS

Harris Laboratories has announced purchase of the Lexington Laboratories, Lexington, Neb. Paul E. Nickel will continue as general manager.

Harris Laboratories President Lewis E. Harris said that plans are developing to expand facilities and service for the agriucltural industry. A Lexington location with more than double the present space has been leased, and new equipment is being installed this summer to enable the lab to handle 80,000 soil samples per year.

SPENCER CHEMICAL FORMS INTERNATIONAL SUBSIDIARY

Formation of Spencer Chemical International, Inc., as a wholly-owned subsidiary to conduct foreign trade operations has been announced by Spencer Chemical Co.

Incorporated in the Republic of Panama, the organization will engage in worldwide sales operations involving all exportable Spencer products not covered by existing sales contracts.

Kenneth A. Spencer, president of Spencer Chemical and chairman of the board of the new corporation, said that it will operate as a separate corporate entity and will have its central office in Panama City.

Officers of the company are G. Maynard Jenkins, president; J. E. Culpepper and Albert Slingerland, vice presidents; Richard Cahill, secretary and treasurer and E. F. McGill, assistant secretary.

Slingerland will become the European representative for Spencer International. He is a native of the Netherlands and a resident of the Hague. Cahill, a resident of Panama City, will manage the corporation's central offices in that city.

FARMERS WARNED AGAINST MIRACLE FERTILIZER CLAIMS

Curtis Overdahl, extension soils specialist at the University of Minnesota, recently warned Minnesota farmers against paying exorbitant prices for so-called "miracle" fertilizers.

He said there have been several reports of salesmen selling liquid fertilizer which is claimed to bring fantastic results when sprayed on leaves. Two or three pounds or gallons of the material in many cases was claimed to equal 100 pounds of conventional fertilizer.

Stick to the known fertilizer products, said Overdahl. "Magic" fertilizers simply don't exist.

PYRETHRUM PLANT TO BE BUILT IN ECUADOR

Industria Extractora C.A., recently incorporated in Ecuador by Dr. Luis Werner Levy and others, plans to establish and operate a plant near Quito to extract Ecuadorean pyrethrum flowers. Dr. Levy, who made the announcement, is director general of the corporation.

The new plant is expected to begin operations in October or November of this year.

GARDEN FERTILIZER DEMONSTRATION

On a hillside just north of Vallejo, Calif. on Highway 50 is this demonstration of Best Fertilizers Co.'s new formulation for its pelleted garden and lawn fertilizer. The 11-8-4 pellets now include 23 per cent soil conditioner plus trace elements.

Patent Reviews

By Dr. Melvin Nord

MAKING AMMONIUM NITRATE

U.S. 2,830,875, issued April 15, 1958 to Robert A. Shurter, Jr., and assigned to Commercial Solvents Corp., describes a one-step process for producing molten ammonium nitrate containing regulated amounts of water.

Ammonia vapors are continuously reacted at 160–300°C. with aqueous nitric acid in a packed reaction vessel free to drain at its lower end. The reaction products are removed in two phases, one of which is steam and the other of which is molten ammonium nitrate.

The improvement provided in this process is introducing 10–60 per cent of the aqueous nitric acid (having a concentration of 40–65 per cent) to the reaction vessel in the form of preheated vaporous aqueous nitric acid—the remainder being in the form of preheated liquid aqueous nitric acid.

UREA-FORMALDEHYDE FERTILIZER COMPOSITIONS

U.S. 2,830,036, issued April 8, 1958 to James M. O'Donnell, assigned to Nitro-Form Agricultural Chemical Co., describes a process for the production of solid urea-formaldehyde fertilizer compositions in which nitrogen is available for plant use.

An example of the method is shown in Fig. 1. As a preliminary treatment, to 470 pounds of 37 per cent commercial formaldehyde was added enough 6N caustic to bring the *p*H to 9.50. The alkalinized formaldehyde was heated to a temperature of 60°C. and 510 pounds of urea were added to the mix. The negative heat of solution reduced the temperature of the mix to 30°C. The liquid mix solution was reheated to about 60°C. and maintained for 20 minutes before it was introduced to a proportioning pump and then to a mixing pump with enough 10 per cent by volume sulphuric acid to bring the *p*H to 3.0.

After the acidified urea-formaldehyde solution passed through the positive displacement mixing pump it was sprayed 16 onto a continuous stainless steel belt 11 whose first section 12 was heated at 90°C. applied temperature at a rate sufficient to form a layer thickness in the range ¼–½ inch.

After the immediate formation of the polymer on the endless stainless steel belt, the material was moved to the second section 13 of the belt where the polymer layer 18 was sandwiched between the original belt 11 and cooling means 15 which consisted of a cooling belt maintained at 10°C. The time elapsing between the introduction of the acidified urea-formaldehyde to the moving belt and cooling was 5 seconds.

The chilling operation was continued for an additional 30 seconds for a sufficient time to reduce the temperature of the layer from about 60°C. (first section) to a range of about 40°C.–45°C. (second section). After cooling, the material came out of the sandwiching mechanism and was neutralized by use of a spraying device 17 with a 5 per cent sodium carbonate solution at a rate sufficient to bring the *p*H to 8.0. The moving layer of polymer next passed to the third or drying section 14 as it continued on the moving endless belt 11 and was heated by applying a temperature of 120°C. for a subsequent drying.

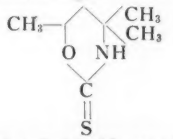
The drying operation was complete after a time of one minute had elapsed in the drying stage or third section 14. The material was then scraped (19a) from the movable belt and granulated (23).

The urea-form product was tested and gave an availability index (AI) of 60 per cent as determined by the Kralovec-Morgan phosphate test for nitrogen activity (1954). The fertilizer product also demonstrated a moisture content of less than 5%.

DEFOLIATING PLANTS

U.S. 2,832,680, issued April 29, 1958 to Alvaro M. Goenaga, assigned to Diamond Alkali Co., describes a method of defoliating plants such as cotton and soy bean.

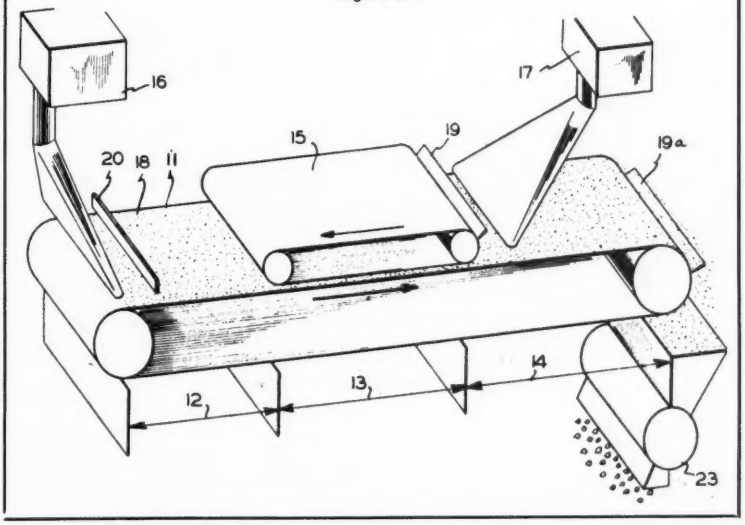
The active ingredient used is



4,4,6-trimethyl-2-thio-tetrahydro-1,3-oxazine

This compound also has excellent insecticidal properties. It is particularly effective against the southern army worm and the Mexican bean beetle.

Figure 1.



SOIL CONDITIONERS

U.S. 2,831,779, issued April 22, 1958 to John G. Erickson, describes a method of improving clay soil, which consists of adding small amounts of aminoquaternary ammonium compounds to the soil.

In contrast to prior soil conditioners, the present soil conditioners are polycationic. They comprise the aminoquaternary ammonium compounds containing one amino group and a quaternary ammonium group.

The effects produced by the aminoquaternary ammonium compound depend upon the nature of the compound. An important use of these aminoquaternary ammonium compounds is for conditioning clay soil for agricultural purposes. The amino group and the quaternary ammonium group react with the soil particles and tend to bind individual particles into aggregates of larger size which no longer possess the colloidal properties of clay when wet.

By employing a compound which has an appreciable solubility in water (5 per cent or more based on the weight of the solution), it is found that the principal effect on clay soil is an improvement in the porosity and friability of the soil. At the same time the soil is put into a condition in which it may be readily wetted.

PRODUCING WEED KILLERS

U.S. 2,830,083, issued April 8, 1958 to Everett E. Gilbert and Sager Tryon, assigned to Allied Chemical Corp., provides an improved method of production of aryloxy aliphatic carboxylic acids by condensation reaction between salts of a phenol and of a chloroaliphatic carboxylic acid.

In accordance with the present invention, alkali metal aryloxy aliphatic carboxylates are produced by reacting alkali metal salts of a chloroaliphatic carboxylic acid and of a phenol in the substantial absence of water. In order to maintain fluidity throughout the course of the reaction, such reaction is carried out in a medium comprising an inert organic liquid.

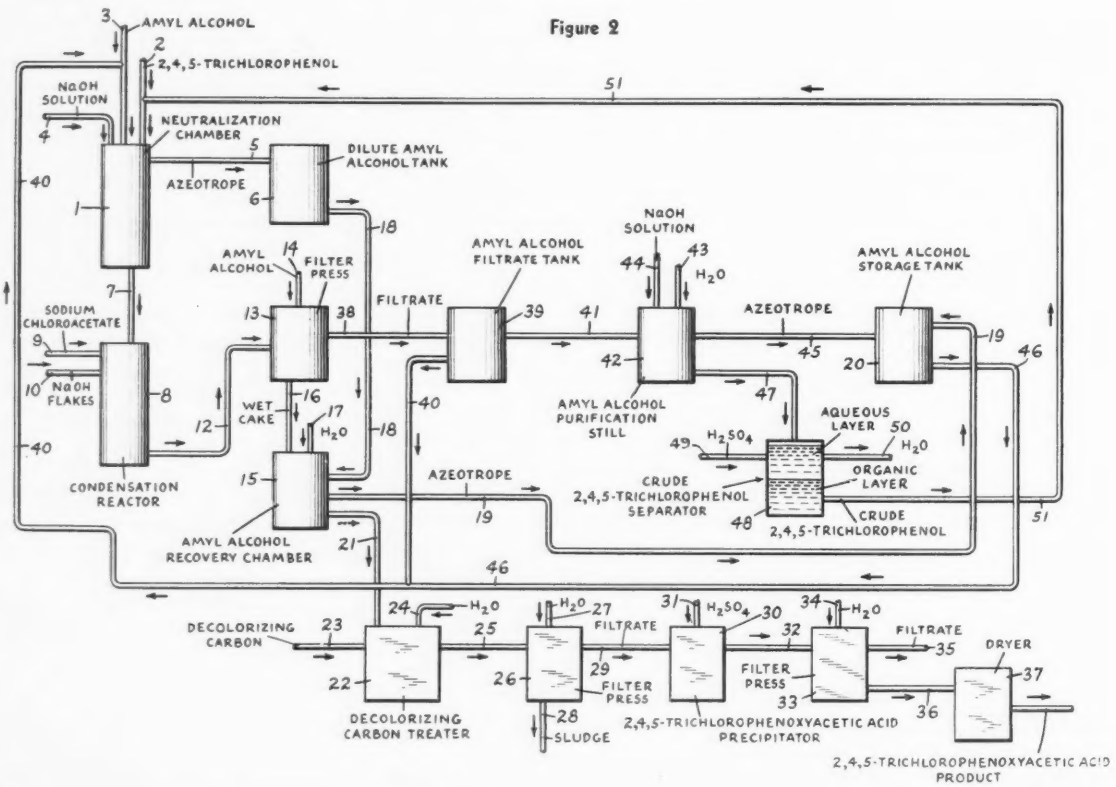
Fig. 2 is a flowsheet illustrating the production of 2,4,5-trichlorophenoxyacetic acid, using amyl alcohol as the reaction medium.

RECOVERING URANIUM VALUES FROM PHOSPHATE ROCK

U.S. 2,830,872, issued April 15, 1958 to Robert F. McCullough and assigned to the United States Atomic Energy Commission, describes a process for recovering uranium values from phosphate rock.

The phosphate rock is acidulated with sulfuric acid in excess of the amount required to form monocalcium phosphate and to react with impurities, with mixing. The uranium is mostly converted to the hexavalent form. The mixture is then aged for 14 days, and is then slurried with water. After separation of the undissolved solids, the uranium in solution is converted back to the quadrivalent stage, and the solution is contacted with an organic solvent containing an ester and phosphoric acid. The resulting organic phase contains the uranium. Calcium sulfate is precipitated out of it with sulfuric acid, and the uranium is subsequently precipitated with hydrofluoric acid.

Figure 2



FARM CHEMICALS People

Agricultural Chemicals, Ltd. sales staff changes: H. R. G. Campbell became sales manager at London, Ont. and L. H. Baril was named sales manager at Chambly, Que.

Before joining AC in March, Campbell was general manager of Oxford Farmers Co-op Co., Ltd., Muirkirk, Ont. Baril has been with the company for 20 years, most recently as assistant sales manager at Chambly.

American Cyanamid Co. Appointment of John C. Bennett as sales manager of American Cyanamid Co.'s Agricultural Div. has been announced by F. S. Washburn, division general manager. Bennett had been in charge of Cyanamid's phosphate sales for the past 12 years.

Bennett

American Potash & Chemical Corp. Mark W. Eichelberger, executive vice president of Lindsay Chemical Div., died recently at Chicago following a prolonged illness. He was with Lindsay from 1920 until his death.

Atlas Powder Co. Ralph K. Gottshall has been elected chairman of the board and reelected president of the company. As chairman of the board, he succeeds Isaac Fogg, who retired Aug. 1 after nearly 46 years of service. Fogg will remain as a director, member of the finance committee and chairman of the committee on audit.

Gottshall

Edward J. Goett was named executive vice president; Edward Massaglia was elected vice president and general manager of the newly-consolidated Chemicals Div.; Robert J. Reilly, treasurer and secretary; and John H. Leary, assistant treasurer and assistant secretary.

Ball, Burge & Kraus. Wilbur H. Evans has retired as a vice president of Diamond Alkali Co. and joined Ball, Burge & Kraus as a limited partner. He will continue as a director of Diamond Alkali.

Collier Carbon and Chemical Corp. Appointment of R. H. McGough to manager, agricultural sales development, and J. G. Baldwin to manager, agricultural chemical sales, has been announced. McGough and Baldwin had been, respectively, sales managers for agricultural chemicals and industrial chemicals.

McGough

Baldwin

Diamond Alkali Co. has appointed C. C. Brumbaugh a vice president. He will have charge of engineering, research and related technical aspects of Diamond's business.

Succeeding Brumbaugh as director of engineering is Robert C. Sutter, operations manager of Diamond's Chlorinated Products Div. for the past year and a half.

Federal Chemical Co. J. T. Marshall has been named production manager of the Louisville plant. Marshall went to Federal in 1937 and for the last six years has been production manager at Butler, Pa.

Marshall

Reed

Seaton A. Reed is new production manager of the Butler, Ind. plant. He was with Davison Chemical Co. 18 years and Baugh and Sons Co. for the past two years.

James M. Miller has been appointed advertising manager and John S. Talbott assistant credit manager.

Geigy Agricultural Chemicals, Div. of Geigy Chemical Corp. Norman D. Thomsen has been named sales representative in the upper north central states, including Wisconsin, Iowa, Minnesota, North Dakota, South Dakota, Montana and northeastern Wyoming. Thomsen had been with Diamond Black Leaf Div. of Diamond Alkali Co., where he was staff assistant to the general sales manager.

Thomsen

International Minerals & Chemical Corp. purchasing department appointments: Effective July 1, Chester F. Teeple is director of purchasing and S. Arthur Fournier is purchasing agent in charge of central buying.

Frank S. Walters, production superintendent in the Plant Food Div., has been awarded the com-

FARM CHEMICALS People

T. M. Ware (right) presented the merit pin to Frank Walters.

pany's 45-year merit pin. The presentation was made by Thomas M. Ware, president. Walters joined IMC as a clerk in East Point, Ga., in 1913. Since 1949 he has been production supervisor in charge of output at IMC's 11 northern plants.

Wilson & Geo. Meyer & Co. has announced the following staff additions and promotions: Henry Kinsell to assistant manager of agricultural sales, Southwest territory, Los Angeles; Delbert Peterson to Seattle, Wash. to assist Jack M. McConkey with agricultural sales in Northwest territory; James Stewart Calkins joins the San Francisco staff to handle sales in northern California and Richard Lewis joins the Fresno office to represent the Meyer firm in the San Joaquin Valley.

National Carbon Co., Div. of Union Carbide Corp. has expanded its chemical products marketing group. Two field sales divisions have been established with headquarters in New York and Chicago. E. S. Malkin has been named eastern division manager and J. F. Brauning, western division manager.

Naugatuck Chemical Div., U. S. Rubber Co. Dr. Wesley S. Coe replaces D. Lorin Schoene as director of research and development. Dr. Coe will supervise all research and development work at the division's main research lab in Naugatuck, Conn., at its experimental farm in Bethany, Conn., and at laboratories in its production plants.

Stauffer Chemical Co. Wyman L. Taylor has been appointed western sales manager, Industrial Chemicals Div. Before his promotion he was administrative assistant to the vice president, Pacific Coast.

Texas Co. Chicago Agronomist C. Loyal W. Swanson was honored with an Alumni Award of Merit during commencement activities at Coe College, Cedar Rapids, Iowa, for "his outstanding contribution to the field of Science."

Velsicol Chemical Corp. Bill Hightower has been appointed technical sales representative. He will operate in the Tennessee-Arkansas area, headquartering in Greenwood, Miss. Hightower is a former Diamond Black Leaf Co. sales representative.

Hightower

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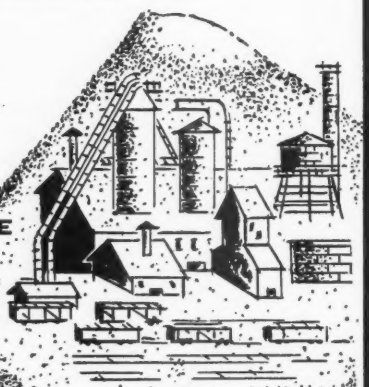
SULPHATE OF AMMONIA

AMMONIUM NITRATE

CALCIUM AMMONIUM NITRATE

UREA

AND ALL OTHER FERTILIZER AND FEED MATERIALS



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AMERICAN POTASH INSTITUTE APPOINTS J. E. SEDBERRY

The American Potash Institute plans to step up its services in forest fertilization with the appointment of Dr. Joseph E. Sedberry, former agronomist with the Louisiana Agricultural Experiment Station and Monsanto Chemical Co.

Sedberry

While much of his time will be devoted to forest fertilization, he will also serve as API agronomist for the two Carolinas, working out of Raleigh, N. C.

REGIONAL ACCIDENT PREVENTION SCHOOLS

The first of five two-day regional accident prevention schools, sponsored by the Fertilizer Section, National Safety Council, with support of the National Plant Food Institute, will be held for the Northeast Region at Statler Hall, Cornell University Campus, Ithaca, N. Y., August 14 and 15.

W. C. Creel, safety director, North Carolina Department of Labor, will be in charge of instruction for the schools.

There will be a clinic on current problems brought up by those attending, and the school will cover such broad areas as safety organization, materials handling and storage, housekeeping and educational and training programs.

Stratton M. McCargo, of G.L.F. Soil Building Service, will be in charge of the program for the school at Ithaca.

The four other schools will be held at Atlanta, Ga.; Chicago, Ill.; Austin, Tex. and San Francisco, Calif.

MCA SPONSORS WORKSHOP ON INDUSTRY SAFETY

On Sept. 25 a chemical industry safety workshop will be held at the Shamrock Hilton in Houston, sponsored by the Manufacturing Chemists' Association in cooperation with the Texas Chemical Council.

The workshop will feature audience-panel discussion on topics relating to the safe production, handling and transportation of chemicals and chemical products.

NPFI NAMES TWO

Adams

Guttay

Merle V. Adams has been named Northeastern regional representative and John R. Guttay a district representative by the National Plant Food Institute.

Adams, who was associate in farm crops at Rutgers University, will be associated with Dr. Willard H. Garman, Northeastern regional director. His office will be at New Brunswick, N. J.

Guttay will headquarter at East Lansing, Mich., covering Indiana, Kentucky, Michigan and Ohio. He will report to Zenas H. Beers, Midwestern regional director of NPFI.

SENATOR TALMADGE TO ADDRESS NAC MEETING

The National Agricultural Chemicals Association has released the preliminary program for its three-day, silver anniversary meeting to be held at the General Oglethorpe Hotel in Savannah, Ga., October 29, 30 and 31, 1958.

The program includes a speech on agricultural progress as related to the pesticide industry, by Senator Herman E. Talmadge of Georgia, and talks by NAC President Jackson V. Vernon, vice president of Food Machinery and Chemical Corp.; John Gillis, vice president of Monsanto Chemical Co. and Frank Washburn, general manager of the Agricultural Div. of American Cyanamid Co.

Members of a panel on public relations are: Charles S. Maddock, general counsel, Hercules Powder Co., (moderator); an NAC staff member; Dr. Cynthia Westcott, "The Plant Doctor;" The Honorable Phillip Alampi, New Jersey Secretary of Agriculture; and Stephen G. Pugh, right-of-way maintenance, Southern Bell Telephone and Telegraph Co.

Members of a panel on new and expanding markets are: Wilbur J. Garmhousen, chief landscape architect, Ohio Dept. of Highways, who will represent roadsides; Dr. Herbert L. Haller, assistant to administrator, production research, ARS, USDA—soil fumigation; William Johnson, chief research forester, Union Bag & Paper Co.—forests; and M. W. Melander, manager, Export Div., Stauffer Chemical Co.—export horizons.

NPFI RESEARCH GRANTS

Grants of $2,000 each have been provided by the National Plant Food Institute to Ohio State University and Kentucky Agricultural Experiment Station.

The Ohio grant was made to help support corn fertilization demonstrations by vocational agriculture teachers.

In Kentucky, the grant is helping agronomists conduct studies to determine the optimum time to apply fertilizers to grass-legume mixtures and to small grains.

FARM CHEMICALS

Associations & Meetings

ASFFCO ELECTS OFFICERS

Bruce Cloaninger, director of the South Carolina Department of Feed and Fertilizer Inspection and Analysis was named president of the Association of Southern Feed and Fertilizer Control Officials at the group's recent meeting in Atlanta.

Serving with him are Harold H. Hoffman, director, Feed Laboratory, Tallahassee, Fla., vice president; and Bruce Poundstone, head of the Department of Feed and Fertilizer, Lexington, Ky., secretary-treasurer.

Among the speeches presented were "Results of National Fertilizer Marketing Survey," by Dr. Samuel Tisdale, Southeastern regional director of the National Plant Food Institute, and "Georgia Soil Fertility Program," by Dr. Ralph Wehunt, extension agronomist, University of Georgia.

The Executive Committee includes outgoing President Dr. E. W. Constable of the Department of Agriculture, Raleigh, N. C.; Maurice Rowe, Richmond, Va.; Frank Fudge, College Station, Tex.; F. S. Carr, Atlanta, Ga. and Henry DeSalvo, Little Rock, Ark.

Next year's meeting is scheduled for June in Little Rock, Ark.

PESTICIDE COMPENDIUM AVAILABLE FROM AAPCO

The Association of American Pesticide Control Officials, Inc. announces the availability of the 1958 edition of *Pesticide Chemicals Official Compendium.*

This edition lists 230 pesticide chemicals currently used for the control of insects, fungi, rodents and nematodes, and for the modification of plant growth. The chemical, common and trade names, molecular weights and physical properties, references to methods for analysis (macro, micro and residue), data on its toxicity, first aid, precautions for handling and use, spray residue tolerance, uses and types of formulations (where available) are given. Past editions have proven useful to food and drug officials, chemists, pharmacologists, physicians and poison-control center personnel as well as pesticide control officials, entomologists and plant pathologists.

Each chemical is presented in a loose-leaf format which will be kept up-to-date annually by the addition of new and revised data sheets. A six-ring hard back cover is provided at a total cost of $4.50 per copy.

Copies may be ordered from: A. B. Heagy, Secretary-Treasurer, A.A.P.C.O., Box HH, University P.O., College Park, Maryland.

WERKHEISER JOINS STAFF OF CSMA

Richard M. Werkheiser has joined the staff of the Chemical Specialties Manufacturers Association as general administrative assistant to A. A. Mullikan, assistant secretary. He had been with the Institute of International Education of the U. S. State Department, as supervisor of foreign students in New York City.

Werkheiser

MONTANA PLANT FOOD ASSN. HOLDS 1ST SUMMER SESSION

Chico Hot Springs Lodge was the site for the first annual summer meeting of the Montana Plant Food Association, formed last year to promote the proper use of fertilizer in the state.

A number of working committees were set up by the association's president, Dean Travis of J. R. Simplot Co., chairman of the two-day session.

The recent survey for the National Plant Food Institute on "Farmers' Attitudes Toward the Use of Fertilizer" was discussed after by F. Todd Tremblay, NPFI Northwest representative, told how the survey could be used to increase proper use of fertilizer in Montana.

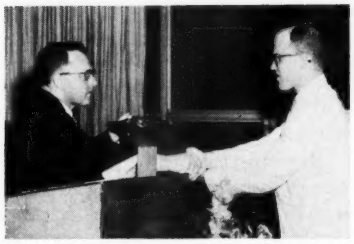
"The High Energy Bonds of Phosphorus" was discussed by

SOIL BUILDERS AWARDS FOR EDITORS

Dr. Paul D. Sanders (left), editor of THE SOUTHERN PLANTER, and W. H. Kircher (right) representing Berry H. Akers, editor-in-chief, THE FARMER, were presented with Soil Builders Awards for Editors by Dr. Russell Coleman (center), executive vice president of the National Plant Food Institute, at the Institute's annual convention in June. There were 34 magazine entries in the contest, which was established by NPFI with the approval of the American Agricultural Editors Assn.

Jesse Green, The Anaconda Co. He said that "there is much evidence to show that the quality of hay and pasture depends as much upon its phosphate content as upon the per cent of protein."

N. C. OUTSTANDING STUDENT



James W. Hendrix (right) was selected as the outstanding student at North Carolina State College of Agriculture to receive the 1958 National Plant Food Institute Agronomy Achievement Award. Consisting of a plaque, an engraved key and a cash prize of $200, the award was presented by Dr. Samuel L. Tisdale (left), southeastern regional director of NPFI.

FERT. SAFETY SECTION MEETS IN OCTOBER

A panel discussion on "Accident Case Histories" is scheduled for the meeting of the Fertilizer Section, National Safety Council, in Chicago on October 21.

Panel participants are: W. D. Smith, Southern States Coop.; Gaither T. Newman, Smith-Douglass Co.; John S. Mark, Farm Bureau Coop. Assn.; Stratton M. McCargo, G. L. F. Soil Building Service; C. K. Brutcher, Davison Chemical Co.; W. A. Stone, Wilson & Toomer Fertilizer Co. and A. I. Raney, Phillips Chemical Co.

CALENDAR

Aug. 12-14. Beltwide Cotton Mechanization Conference, Civic Auditorium, Brownsville, Tex.

Aug. 14-15. Regional Accident Prevention School sponsored by Fertilizer Section, National Safety Council, at Statler Hall, Cornell University Campus, Ithaca, N. Y.

Aug. 20-24. Canada Fertilizer Association annual meeting, Manoir Richelieu, Murray Bay, Que.

Sept. 7-12. American Chemical Society national meeting, Chicago.

Sept. 9-12. National Chemical Exposition, sponsored by Chicago Section, American Chemical Society, International Amphitheatre, Chicago.

Sept. 15-19. Instrument-Automation Conference and Exhibit, Philadelphia, Pa.

Sept. 15-17. Canadian Agricultural Chemicals Association annual meeting and conference, Fort Garry Hotel, Winnipeg, Canada.

Sept. 25. Chemical Industry Safety Workshop, Shamrock Hilton Hotel, Houston, Tex. Sponsored by Manufacturing Chemists' Association.

Oct. 13. Agricultural Research Institute panel on problems related to agriculture in the fertilizer producing industry, Academy of Sciences Bldg., Washington, D. C.

Oct. 14-15. Western Agricultural Chemicals Assn. annual meeting, Villa Hotel, San Mateo, Calif.

Oct. 16. National Plant Food Institute conference on chemical control problems, Shoreham Hotel, Washington, D. C.

Oct. 20. Sales clinic of Salesmen's Association of the American Chemical Industry, Roosevelt Hotel, New York City.

Oct. 20-21. Fertilizer Section, National Safety Council annual fall meeting, LaSalle Hotel, Chicago.

Oct. 22-24. Pacific N. W. Plant Food Assn. annual meeting, Gearhart, Ore.

Oct. 28. Assn. of Consulting Chemists & Chemical Engineers annual meeting, Biltmore Hotel, New York City.

Oct. 28-29. Northwest Garden Supply Trade Show, Masonic Temple, Portland, Ore.

Oct. 29-31. 25th annual meeting, National Agricultural Chemicals Assn., General Oglethorpe Hotel, Savannah, Ga.

Oct. 30. Southeastern Soil Fertility conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Nov. 4-6. Canadian National Packaging Exposition sponsored by Packaging Assn. of Canada, Automotive Bldg., Exhibition Grounds, Toronto, Ont.

Nov. 5-7. Fertilizer Industry Round Table. Mayflower Hotel, Washington, D. C.

Nov. 9-11. Calif. Fertilizer Association 35th annual convention, Ambassador Hotel, Los Angeles.

Nov. 10-11. Agricultural Aviation Research conference, Milwaukee, Wis.

Nov. 24-25. Eastern Branch, Entomological Society of America annual meeting, Lord Baltimore Hotel, Baltimore, Md.

Dec. 1-4. Annual meeting of Entomological Society of America, Hotel Utah, Salt Lake City.

Dec. 3-4. North Central Weed Control conference, Netherland Hilton Hotel, Cincinnati, O.

Dec. 3-5. Agricultural Ammonia Institute annual meeting, Morrison Hotel, Chicago.

Dec. 9-11. Annual meeting of Chemical Specialties Mfrs. Assn., Commodore Hotel, New York City.

Dec. 17-18. Beltwide Cotton Production Conf., sponsored by National Cotton Council, Rice Hotel, Houston, Tex.

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WILEY AWARD TO K. D. JACOB

Kenneth D. Jacob, chief, Fertilizer Investigations Research Branch, Soil and Water Conservation Research Div., U.S. Department of Agriculture, has been selected to receive the 1958 Harvey W. Wiley Award of the Association of Official Agricultural Chemists.

K. D. Jacob

This award was established in 1956 to honor the father of the original Pure Food and Drug Law and the founder of the association. It consists of $500 which goes annually to the scientist who makes an outstanding contribution to the development of methods for the analysis of foods, drugs, cosmetics, feeds, fertilizers, pesticides or for use in general analytical chemistry.

Announcement of the award was made by Frank A. Vorhes, Jr., director, Division of Food, Food and Drug Administration and president of the AOAC. In notifying Jacob of his award Vorhes said:

"Your forty years of scientific service in the public interest has been impressively productive toward objectives of the Association in the fields of fertilizer technology and analysis. Your contributions to understanding of the role of phosphates in fertilizer utilization have immeasurably benefited not only American agriculture, but the welfare of man throughout the civilized world. The fundamental principles you have elucidated for phosphate analysis of fertilizers furnish also the basis for methods applicable to many other materials with which the Association is concerned."

Jacob began his professional employment as a chemist in the ChemicalWarfare Service of the U. S. Army in 1918 and joined the Department of Agriculture and started his studies on phosphate fertilizers in 1919. In 1947 he received the Superior Service Award of USDA "for his research on world phosphate resources, technology and the initiation and use of the one-step thermal method of producing available phosphate material from raw phosphate." He has served the U.S. Government as a member of technical missions and as delegate to international conferences on fertilizers.

More than 150 of his papers have been published on methods for laboratory evaluation of fertilizers, agronomic evaluation of fertilizers, chemical composition and physical nature of natural phosphates, fertilizer technology, with particular emphasis on the solubilization of phosphate rock by thermofluorination, and resources, production, marketing and uses of fertilizers.

Jacob was born at Carpenter, Miss., and attended high school at Lucedale, Miss. He graduated from Mississippi Agricultural and Mechanical College with a BS degree and received the MS degree in chemistry at George Washington University. His residence is in Washington, D. C.

MAN-KILLING RADIATION DOESN'T AFFECT NEMATODES

Nematodes are unexpectedly resistant to radiation, USDA scientists report.

The golden nematode can withstand radiation up to 20,000 roentgens before the females are sterilized. It takes 120,000 roentgens or more to kill this plant parasite, and some other kinds of nematodes require between 350,000 and 640,000 roentgens for a lethal dose.

By comparison, the dosage considered invariably lethal to man is 650 roentgens. Some human fatalities may occur from exposures of as little as 300 roentgens.

Since nematode-killing doses of radiation will injure plants, USDA said there is no prospect that radiation can be used for killing the pest on living plants. Scientists had hoped that nursery stock now being quarantined to prevent the spread of plant-parasitic nematodes to non-infested areas could be freed of the pests by exposing them to radiation.

Experiments were started two years ago in USDA's Nematology Laboratory at Beltsville, Md., and at the Brookhaven National Laboratory on Long Island, N.Y., to find whether rays from radioactive materials could be used to destroy nematodes on soil and on plant material.

USDA MODIFIES JAPANESE BEETLE QUARANTINE

Relatively light infestations of Japanese beetles in many areas of the eastern U. S. regulated by federal quarantine have made possible a change in the usual method of applying summer regulations designed to prevent spread of this pest, USDA says.

When beetles are in flight (June to September), normal summer regulations will still apply in regulated areas, but will be operative only when and where local inspectors find that beetle activity is hazardous to interstate movement of articles and means of transportation that may be infested.

USDA stressed that the year-

round regulation covering movement of soil and plants which might carry grubs or eggs of the pest continues unchanged.

ICA AUTHORIZATIONS

Korea. $1,500,000—nitrogenous ($300,000) and phosphate ($1,200,000) fertilizers. (PA 89-230-99-L1-8021). Contract period: June 1 to Sept. 30. Source: World wide. Terminal delivery date: Nov. 30, 1958. Barter provision applies.

$2,000,000—nitrogenous fertilizers (PA 89-230-99-L1-8022). Contract period: June 1 to Sept. 30. Source: World wide. Terminal delivery date: Nov. 30, 1958. Barter provision applies.

Turkey. $100,000—phosphate rock (PA 77-99-L1-8272, code 2351). Contract period: June 11, 1958 to Feb. 28, 1959. Source: World wide. Terminal delivery date: June 30, 1959.

Vietnam. $275,000—nitrogenous fertilizers (PA 30-230-99-L1-8040). Contract period: April 30 to Oct. 31. Source: World wide. Terminal delivery date: Dec. 31, 1958. Barter provision applies.

FC Statistics

POTASH OUTPUT, EXPORTS UP IN '57

Production of marketable potassium salts in this country continued its upward trend in 1957, and reached a new high of more than 3.8 million short tons, according to reports by producers to the Bureau of Mines, U. S. Dept. of the Interior.

Sales and apparent consumption of potassium salts in 1957 remained about the same as 1956. Stocks in producers' hands at the end of 1957 were 27 per cent more than at the end of 1956. Figures for the year are shown in the table below.

Statistics of the Potash Industry, 1956–57

(In thousand short tons and thousand dollars)

		1956	1957
United States:			
Production of potassium salts (marketable)	quantity	3,679	3,840
Approximate equivalent K_2O	quantity	2,172	2,266
Value[2]		$82,107	$84,612
Sales of potassium salts by producers	quantity	[1]3,572	3,625
Approximate equivalent K_2O	quantity	2,103	2,137
Value at plant		[1]$79,768	$79,628
Average per ton		$22.33	$21.97
Imports of potash materials	quantity	334	339
Approximate equivalent K_2O	quantity	181	182
Value		$12,018	$11,823
Exports of potash materials	quantity	398	467
Approximate equivalent K_2O	quantity	226	234
Value		$14,937	$17,506
Apparent consumption of potassium salts	quantity	3,508	3,497
Approximate equivalent K_2O	quantity	2,058	2,085
World: Production (marketable)			
Approximate equivalent K_2O	quantity	8,300	8,700

[1] Revised figure.
[2] Derived from reported value of "sold or used."

Production—April, 1958

Compiled from Government Sources

Chemical	Unit	April 1958	April 1957	March 1958
Ammonia, synth. (anhydrous)	s. tons	329,837	321,529	339,015
Ammonia, byproduct liquor (NH_3 content)	s. tons	1,141	1,347	1,241
Ammoniating solutions (incl. urea ammoniation sol.) 100% N	s. tons	82,337	———	64,364
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	208,512	196,747	217,501
Ammonium sulfate				
synthetic (technical)	s. tons	97,603	98,366	101,116
byproduct	s. tons	48,793	77,927	53,001
BHC (Hexachlorocyclohexane)	pounds	3,481,420	3,485,121	1,711,960
Gamma content	pounds	602,941	608,395	366,433
Calcium arsenate (commercial)	s. tons	———	———	———
Copper sulfate (gross)	s. tons	4,304	———	3,472
DDT	pounds	11,351,113	11,766,410	11,880,845
2,4-D acid	pounds	3,703,124	2,719,247	3,599,178
esters and salts	pounds	4,905,771	3,192,170	3,427,073
esters and salts (acid equiv.)	pounds	3,685,001	2,417,339	2,648,139
Phosphoric acid (100% P_2O_5)[1]	s. tons	157,076	356,352	155,192
Sulfur, native (Frasch)	l. tons	402,581	461,589	429,475
recovered[2]	l. tons	46,195	37,650	51,104
Sulfuric acid, gross (100% H_2SO_4)	s. tons	1,296,892	1,389,140	1,363,696
Superphosphate and other phos. materials (100% APA)	s. tons	241,763	227,202	*229,982
normal and enriched (100% APA)	s. tons	202,176	200,612	*221,799
concentrated (100% APA)	s. tons	72,505	61,337	78,624
ammonium phosphates (100% APA)	s. tons	15,994	16,329	16,239
other phos. ferts. (incl. wet-base goods) (100% APA)	s. tons	13,934	9,258	12,064
2,4,5-T acid	pounds	336,083	509,621	———
Urea (total primary production)	pounds	88,413,356	88,359,833	82,306,035

*Revised. [1]Published on 50% H_3PO_4 basis prior to January 1958. The factor used to convert to 100% P_2O_5 basis is 0.3622. [2]Recovered sulfur of a purity of 97 per cent or greater.

Statistics

CHILEAN NITRATE OUTPUT INCREASES 14% OVER '56

Production of Chilean nitrate amounted to 1,321,000 metric tons in 1957, a 14 per cent increase over that of 1956, but almost 15 per cent below 1955 output, reports the U. S. Department of Commerce.

Exports were up about 5 per cent to 1,255,000 tons in 1957. The United States continued to be the largest market, accounting for 45 per cent of exports. Spain and France were next.

Production and exports of potassium nitrate were 71,617 tons and 78,352 tons, respectively, in 1957.

BORON MINERALS OUTPUT INCREASED 5% IN 1957

In 1957, production of boron minerals and compounds (as measured by gross weight, sold or used by producers) increased 5 per cent to a total of 585,545 short tons valued at $39,413,721, according to reports by producers to the Bureau of Mines.

There was continued expansion of industrial production. The three firms reporting production of boron minerals were American Potash & Chemical Corp., Pacific Coast Borax Div. of U. S. Borax and Chemical Corp. and West End Chemical Div. of Stauffer Chemical Co.

57 PHOSPHATE ROCK SALES SET RECORD, OUTPUT DOWN

Phosphate-rock ore and marketable phosphate rock production decreased 13 and 11 per cent, respectively, in 1957, producers reported to the Bureau of Mines. The high output in 1956 was to rebuild normal working stocks, largely depleted during 1955 when activities in the Florida land-pebble field were curtailed by a labor strike.

The total phosphate rock sold or used by U.S. producers again set a new record, rising 3 per cent above 1956 to more than 14.5 million long tons. Florida, the western states and Tennessee all reported increases. Production, consumption, imports and exports are shown in the table below.

AG LIME IN APRIL

Sales of agricultural lime in April totaled 30,290 short tons—6,827 of quicklime and 23,463 tons of hydrated lime, an increase over the previous months sales.

In March, 3,118 tons of quicklime and 13,965 tons of hydrated lime were sold for agricultural purposes.

APRIL SUPER SHIPMENTS

Shipments of superphosphate and other phosphatic fertilizers during April increased 8 per cent compared with March figures, reaching a total of 233,514 short tons. Stocks at producing plants were 274,653 tons on April 30, 23 per cent less than on March 31.

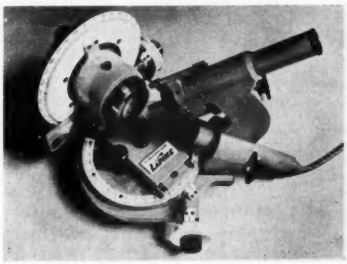
Salient Statistics of the Phosphate Rock Industry, 1956–57

	1956				1957			
	Thousand long tons		Value at mines		Thousand long tons		Value at mines	
	Rock	P_2O_5 content	Thousand dollars	Average per ton	Rock	P_2O_5 content	Thousand dollars	Average per ton
United States:								
Mine Production	52,198	5,752	[1]	[1]	45,460	6,435	[1]	[1]
Marketable production	15,747	4,960	[2]97,922	[2]$6.22	13,976	4,356	[2]87,689	[2]$6.27
Sold or used by producers:								
Florida:								
Land pebble	10,366	3,425	64,354	6.21	10,508	3,467	66,863	6.36
Soft rock	59	12	376	6.40	56	12	401	7.15
Hard rock	103	36	872	8.45	80	28	682	8.59
Total Florida	10,528	3,473	65,602	6.23	10,644	3,507	67,946	6.38
Tennessee	1,663	434	12,792	7.69	1,778	459	11,857	6.67
Western States:								
Idaho	1,206	314	6,044	5.01	1,418	374	6,589	4.65
Montana					575	166	4,129	7.18
Wyoming	714	211	4,794	6.72	182	58	1,197	6.60
Total Western States	1,920	525	10,838	5.64	2,175	598	11,915	5.48
Total United States	14,111	4,432	89,232	6.32	14,597	4,564	91,718	6.28
Imports	110	[1]	[3]2,626	[3]23.90	110	[1]	[3]3,090	[3]28.21
Exports[4]	2,685	876	15,649	5.83	3,010	977	20,070	6.67
Apparent consumption	11,536	[1]	.....	.....	11,697	[1]	.....	.....
World production	33,750	[1]	.....	.....	32,350	[1]	.....	.....

[1] Data not available.
[2] Derived from reported value of "sold or used."
[3] Market value (price) at port of shipment and time of exportation to the United States.
[4] As reported to the Bureau of Mines by domestic producers.

FARM CHEMICALS
Equipment & Supplies

OPTICAL ANALYSIS OF CRYSTALLINE SUBSTANCES



Optical Goniometer

Crystalline substances can be identified by simple external measurements of interfacial angles through the use of a new optical goniometer, according to Arthur S. LaPine and Co.

Once a crystalline substance has been "fingerprinted" by having its interfacial angles measured, it can always be recognized by making a few external measurements, said LaPine.

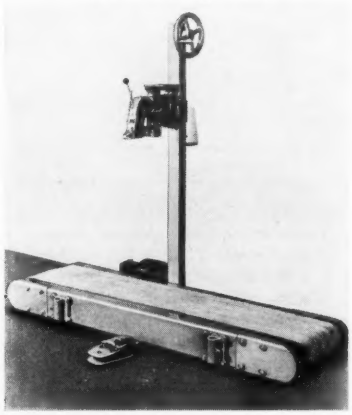
For copies of a 2-page data sheet on the goniometer and a 4-page reprint, "A New Aid to the Study of Crystals,"

CIRCLE 216 ON SERVICE CARD

FISCHBEIN INTRODUCES BELT CONVEYOR BAG CLOSER

A new belt conveyor sewing unit was recently introduced by Dave Fischbein Co. Called the Model B-5, the entire unit operates from one 110 volt light outlet, with no special wiring, the manufacturer says.

Model B-5 Bag Closer

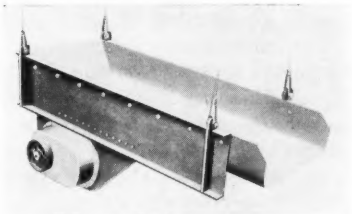


The two-stage switch operation is controlled by foot pressure by the operator. The first stage starts the movement of the conveyor belt to carry the bag to the sewing head, and the second stage starts the sewing operation. The machine stitches at the rate of 30 feet per minute.

The conveyor is 5 feet long and the belt is 12 inches wide. Specifications, literature and prices are available by

CIRCLING 217 ON SERVICE CARD

LINK-BELT FEEDER FOR BULK MATERIALS



Vibrating Feeder

For controlled feeding of a wide range of bulk materials at high rates, Link-Belt Co. has just announced its Straightline Geared Counterweight Vibrating Feeder.

Capable of absorbing great impacts, the new unit can be mounted directly under a hopper or bin to feed, convey, pick or scalp high tonnages of materials, including lumps up to 36-in. diameter. A geared eccentric shaft mechanism produces a high intensity straight-line stroke that ranges in amplitude from ¼ to ½ in. up to 900 RPM.

The feeder is available in a wide range of dimensions. For a brochure containing complete information

CIRCLE 218 ON SERVICE CARD

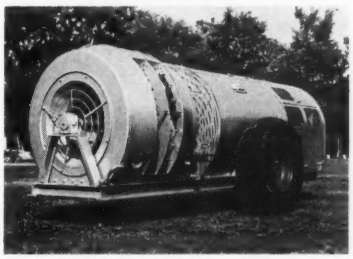
MYERS ORCHARD AIR SPRAYERS INTRODUCED

A new line of orchard air sprayers, designed to handle spraying needs of both small and large orchards and groves, was introduced last month by F. E. Myers & Bro. Co.

Five basic units, with interchangeable parts to minimize service and replacement requirements, comprise the new line.

For information on the units,

CIRCLE 219 ON SERVICE CARD



Centrifugal pump in this 232 series sprayer produces 120 gpm at 90 lbs. pressure.

NEW FUSED SILICA MATERIAL HAS MANY APPLICATIONS

Pittsburgh Corning Corp. has announced development of an entirely new acid-resistant insulating and refractory material. Called Foamsil, it is 99 per cent pure fused silica and can neither oxidize nor absorb moisture. It is unaffected by all acids except hydrofluoric and hot phosphoric.

The material is said to offer continuous insulating protection and withstands thermal shock within the range of —450°F. to 2200°F.

For complete information on the material,

CIRCLE 220 ON SERVICE CARD

Acid-Resistant Foamsil

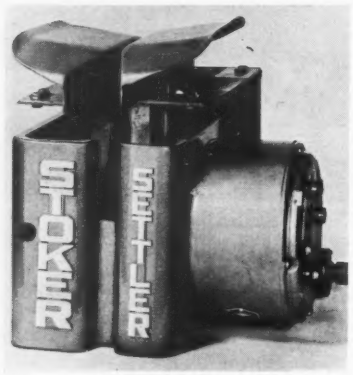
FARM CHEMICALS

Equipment & Supplies

STOKER SETTLER MAINTAINS WEIGHT ACCURACY

H. L. Stoker Co. says its Model "B" Settler is an exclusive Stoker accessory which, for the first time, makes it possible to settle material in the bag during the entire filling cycle without affecting the weighing mechanism of the packer.

Benefits claimed include precision weight accuracy at higher production rates, reduced bag and warehousing costs and improved package appearance. An adjustment controls the intensity and frequency of the Settler to meet physical characteristics of most packaged materials.



Model "B" Settler

More information is yours by
CIRCLING 221 ON SERVICE CARD

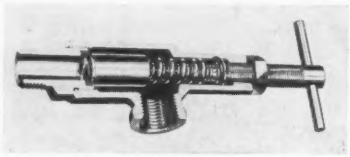
POCKET MICROSCOPE WITH ADJUSTABLE POWER

Hardly bigger than a fountain pen, the industrial pocket microscope is said to have many uses—in production, engineering, in the lab or shop.

Power is readily adjustable to 20X, 40X or 60X by sliding tube in or out, according to Edmund Scientific Co. of Barrington, N. J.

SPRAYING SYSTEMS HAS NEW PRESSURE RELIEF VALVE

In its new pressure relief valve, Spraying Systems reports that the valve guide and inlet adapter are fitted with hardened stainless steel inserts to provide a high degree of resistance to abrasive wear. Balance of the unit is made of brass with stainless steel springs. Two springs with different tensions are provided, the lighter one controlling lower pressure settings and the heavier spring controlling higher pressure settings.



Cutaway View of P.R. Valve

Complete information is contained in a data sheet available by
CIRCLING 222 ON SERVICE CARD

PRINT-A-CAN PRINTER FOR 5 GALLON PAILS

Quality printing on five-gallon pails is now possible at extremely low cost with a portable printing device developed by Chapman Chemical Co., according to its distributor, Bennett Industries.

Called the Chapco PRINT-A-CAN Printer, it will handle all types of five-gallon pails, open or closed head, with or without rolling hoop. It weighs only 160 pounds and, equipped with casters, is portable.

The machine uses rubber printing plates molded from standard typographic forms or hand set by assembling rubber type on an interlocking base.

An accessory, the Chapco PRINT-A-DRUM Printer, is available for printing 30 and 55 gallons drums. The same plates can be used.

The Print-A-Can Printer

For prices and additional information,
CIRCLE 223 ON SERVICE CARD

NEW SUTTLE EQUIPT. PORTABLE DEHUMIDIFIER

Suttle Equipment Co. is now manufacturing a portable room dehumidifier said to effectively remove two to three gallons of water from the atmosphere every 24 hours, suitable for industrial or home use.

The Atmo-Dry contains a removable rust-proof drawer which can easily be emptied, or a permanent drain can be installed so that no attention is necessary.

The company also manufactures a companion dust-collector unit. Details on both pieces of equipment are available by
CIRCLING 224 ON SERVICE CARD

FIBERCAST CORP. ADDS TO PIPE AND TUBING LINE

Fibercast line pipe and well tubing are now being produced in 4½" O.D. size, according to H. D. Boggs, general manager of Fibercast Corp. Fibercast is a non-corrosive pipe made from thermo-setting reinforced epoxy resins. Although it is 4-⅓ times lighter than steel, the pipe takes high operating pressures and temperatures, said Boggs.

Introduced in 1953 in sizes of 2-⅜", 2-⅞" and 3-½", the pipe has been useful in the chemical, fertilizer, petroleum and paper industries—particularly where severe corrosive conditions exist—says the company.

FOR SALE: Nearly new, 3 scale, stainless steel, open mouth Bemis bagger and "V" bag conveyor. C. ROY CURTIS & SON, INC., Marion, N. Y.

SALE: Horizontal Aluminum Tanks 4,000, 7,000 gallons. Steam Tube Dryers (Tubes Removable) 6′ x 50′, 6′ x 30′, 4′ x 30′. Ribbon Mixers 336, 200, 75 cubic foot working capacity. Also Hammermills, Dewatering Presses, Conveyor, etc. PERRY, 1430 N. 6th St., Philadelphia 22, Pa.

LEITH PLANT *(from page 18)*

phoric acid is stepped up from 30–32 per cent P_2O_5 to the range of 31–37 per cent P_2O_5 in a single effect vacuum type evaporator designed by Svenson Evaporator Company. Steam at 10 p. s. i. is applied to the external heat body fitted with carbon tubes in tube sheets of homogeneously lead covered steel. The flash chamber, vapor piping, liquor piping and condenser are of rubber-lined steel. The condenser uses sea water and the vacuum is produced by a two-stage steam jet ejector with an inter-condenser between the stages.

On each pass of the liquor through the evaporator an acid concentration range of one or two per cent P_2O_5 is obtained. The evaporator is designed for high circulation because of the gypsum and fluosilicates content of the wet process acid which would otherwise tend to deposit. Even so, there is some deposition on the pipelines and duplicate sets are provided to allow for cleaning. The operation time schedule of the evaporator further permits fairly frequent shut downs for boiling out.

For the production of ammonia gas, the plants, supplied by Coppee Ltd., include two synthetic ammonia stills of bubble cap tray design heated by 25 p. s. i. steam, and a plant for the recovery of ammonia from by-product liquor which is under construction.

When the evaporated wet process phosphoric acid is neutralized with ammonia gas in the four reaction vessels provided, a slurry is formed containing ammonium phosphate, ammonium sulfate and impurities such as iron and aluminum phosphates and fluosilicates. The nitrogen in ammonium phosphate is only a small proportion of the nitrogen normally required for NPK compound fertilizers and the remainder has to be supplied either as solid ammonium sulfate or by the neutralization of added sulfuric acid by gaseous ammonia in the same reaction vessel. Potash, in muriate form containing 60 per cent K_2O, also has to be added.

Since the moisture level in the slurry is too high to granulate properly with only the fresh salts added to the system, it is necessary to carry a recirculating load of dry material composed of crushed oversize and fines from the screens and occasionally a proportion of product size material. The slurry meets the newly added salts and the recirculating dry solids in a blunger consisting of a twin shaft trough mixer which produces from the two streams of material a granular product of moisture content in the region of five per cent.

From the blunger the material passes to a large rotary co-current dryer of 11 ft. diameter and 93 ft. length with a pulverized coal type furnace. The air flow from the dryer lies in the range 40,000 to 50,000 cu. ft. per minute and is provided by a single stage high-efficiency fan supplemented by fans in the scrubbing section of the plant. From the dryer the material passes to the screens and the storage and packing section of the plant. ▲

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LIME and FERTILIZER SPREADER

World's most efficient spreader body . . . K-5 absolutely guarantees you better trouble-free, money-saving performance for your investment! With this experience-engineered spreader, you can ACCURATELY REGULATE THE NUMBER OF POUNDS SPREAD per acre and BE SURE OF UNIFORM DISTRIBUTION. K-5 features:

- Twin distributors with positive material flow from controllable discharge chute . . . for greater spreading efficiency. (Single distributor if you prefer.)
- Lower maintenance cost . . . thanks to the most rugged spreader body ever built.
- Lube-impregnated chain drive, a Baughman exclusive, that positively insures greater corrosion resistance and virtually eliminates chain "freezing."
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DOW MARKETS INVERTON 245 INDUSTRIAL HERBICIDE

Dow Chemical Co. has begun marketing a herbicide that limits the possibility of spray drift damage to crops. Called Inverton 245, the compound is a 2,4,5-T material formulated in an invert emulsion.

The invert emulsion is a dispersion of oil particles through water. The thick spray is applied in large particles that do not break into a mist. In addition, the product is based on a non-volatile free acid, cutting the possibility of damage to adjacent crops from herbicide vapors.

Inverton 245 is best suited to industrial applications such as spraying along roadsides, railroads or power lines. It is not suited for use in farm fields.

USDA RECOMMENDS CO-RAL SYSTEMIC

Chemagro's CO-RAL (Bayer 21/199) has been recommended by the U.S. Department of Agriculture for control of certain livestock pests. The new USDA recommendation adds the spray to several materials recommended for control of these pests.

Chemical name of the active ingredient is 0-(3-chloro-4-methylumbelliferone) 0,0-diethylphosphorothioate.

Sixty days must elapse between the last application and slaughter. It is not recommended for use on dairy cattle, since it is known to secrete in the milk for a week or 10 days following treatments. As with other insecticides, no tolerance has been established in milk.

When applied externally as a single spray treatment, CO-RAL is absorbed and acts systemically to kill 75 to 100 per cent of young cattle grubs in the animal's tissues. As a contact insecticide against ticks and horn flies, it provides protection for two to three weeks.

One of the successful uses is in screwworm control. A single treatment destroys existing infestations and usually protects against reinfestation until the wounds heals, or 7 to 14 days. It is being used routinely in the federal-state screwworm quarantine program in Florida to treat livestock moving from infested to uninfested areas.

A folder available from Chemagro contains information and test data on the effectiveness of the spray material against cattle grubs, screw-worms, hornflies, lice and ticks. Application instructions are also included. For a copy,

CIRCLE 225 ON SERVICE CARD

FARMERS '55 PESTICIDE EXPENDITURES

Farmers spent $232 million for pesticides in 1955, according to a study conducted by the U. S. Departments of Agriculture and Commerce.

Largest amount spent was reported by cotton farmers for control of the boll weevil—$59.6 million, an average of $142 per farm. The largest average per farm, $498, was reported by vegetable farmers, who purchased $14.5 million during the year. Other farm groups reporting and the amounts spent were as follows:

Expenditures for Pesticides, Jan.-Dec., 1958

Type of farm	Total (000 $)	Average per farm ($—
Cash-grain	32,204	59
Other field crops	25,282	99
Fruit and nut	32,097	414
Dairy	8,689	15
Poultry	3,045	19
Livestock, other than dairy and poultry	29,242	39
General, primarily crop	14,225	197
General, primarily livestock	1,186	17
General, crop and livestock	8,932	42
Miscellaneous	3,403	114

According to recent USDA studies, the boll weevil takes an average 10 per cent bite from the annual cotton crop and costs U. S. growers more than $300 million a year, including the cost of applying insecticides.

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PEST REPORTS

Presented in cooperation with the Economic Insect Survey Section, Plant Pest Control Branch, Agricultural Research Service, USDA.

WHITE GRUBS DAMAGE RANGE IN KANSAS

White grubs, the larvae of the May beetle group, have caused considerable damage to range grasses in the "flint hills" area around Manhattan, Kansas. Probably three or more species of *Phyllophaga* are involved in a spotted infestation covering approximately 500 square miles in Geary, Wabaunsee, Riley and Pottawatomie Counties.

It is estimated that 25 per cent of the rangeland in the area involved carries an infestation ranging up to 8 per square foot. Infested spots varied in size from very small up to 80 to 100 acres with the expectation that the damaged areas would be extended. Control by ranchers is underway. Granular aldrin and heptachlor are being recommended.

APHIDS ACTIVE ON FRUIT

By late June aphids were increasing rapidly on apples in Massachusetts and New Jersey. The insects were abundant in numerous orchards at Vincennes, Indiana, and were especially noticeable on water shoots of apples at Coloma, South Haven and Grand Rapids, Michigan. Earlier in June damage was reported from the Carbondale, Illinois, area.

Orchard mites were building up rapidly by late June in the Orleans, Indiana area and were on the increase in the Wooster, Ohio section where controls were not applied. The pests were very serious in some Oconee County, South Carolina, orchards. At Carbondale, Illinois, the European red mite was generally present and increasing.

Heavy infestations of the plum curculio were reported from Sabine Parish, Louisiana and emergence was heavy at Fort Valley, Georgia. The insect continued active around the middle of June in all fruit growing areas of Michigan and was apparently more important in northern Illinois than normal.

EUROPEAN CORN BORER DAMAGES CORN IN ALA.

Reports received in late June stated that first generation European corn borers were causing the most severe damage ever observed in early corn in the Tennessee Valley of Alabama. As evidence of the continued spread of the pest in the state a larva was collected June 22 for the first time in Randolph County which is in east central Alabama. The borer was extremely heavy in the eastern and southeastern areas of Arkansas. In one Desha County field of tasseling corn 60 per cent of plants showed signs of feeding. The insect was also reported on corn in Bolivar and Oktibbeha Counties, Mississippi.

The corn earworm was on the increase in early field corn in western Sussex County, Delaware by late June and was causing some damage to peanuts in Sussex County, Virginia. In north central Alabama approximately 100 per cent of the ears of early maturing corn was damaged by the pest which was continuing to increase in numbers in both the northern and southern parts of the state. The insect was heavy in east central and northeastern Oklahoma. In New Mexico the corn earworm was causing considerable damage to corn in most areas of the state.

The chinch bug caused damage to crops in several states during late June. Corn and sorghum were damaged in eastern Kansas with replanting necessary in some untreated fields in Republic and Cloud Counties. Populations were medium to heavy in most corn and sorghum fields in east central and central Oklahoma and in local areas of Texas. In west central and southwestern Missouri small corn, sorghum and Sudan grass was being severely damaged. By the middle of June movement from small grain to corn was underway locally in North Carolina with some damage reported.

GRASSHOPPER CONTROL PROGRAM PROGRESSES

The grasshopper control program reported last month in FARM CHEMICALS is progressing satisfactorily. As of July 8, a total of over 4,800,000 acres of roadside, range and idle lands had been scheduled for the cooperative control program in 55 counties in Colorado, Kansas, New Mexico, Oklahoma and Texas. More than two million acres have been completed and to the July date very little damage to crops had been noted.

OTHER INSECT ACTIVITY

Bollworms were perhaps causing the most damage to cotton of any pest in late June and early July. As a whole, cotton insects were not as serious a problem as in many past seasons. In most Alabama cotton fields bollworms were a problem with populations ranging from medium to heavy. Older cotton was being damaged in Tennessee and in fields near Peoria, Arizona.

Fleahoppers were building up in parts of Oklahoma and causing damage in parts of South Carolina, Tennessee, Texas and New Mexico. Lygus bugs were heavy in Imperial County, California and causing more damage in Mississippi than all other cotton

insects combined. Boll weevils by the first of July had not been reported as being an extremely severe problem in any state.

Among the truck crop pests perhaps flea beetles were causing the most widespread damage. These insects were heavy in parts of Rhode Island, West Virginia, Pennsylvania, Alabama, Wisconsin, New Mexico and Idaho, as well as other areas. ▲

A TRIBUTE TO WEED CONTROL WITHOUT CHEMICALS

Last month an unusual monument was unveiled in Eureka, California. Unusual? Yes, because it was made possible by a beetle.

In 1912, the presence of a weed—variously called Klamath Weed, Tipton Weed, or Goat Weed—was noted in northwestern California. In a few years, it made many thousands of acres there and in the Willamette Valley of Oregon useless for agriculture.

In 1931 Dr. A. M. Sampson, associate professor of forestry and plant ecologist at the University of California, pointed out that beetles had recently been brought from Australia to Europe to control the weed. Wool growers asked the University of California to send Dr. Sampson to Australia to study the situation, and range land owners raised money to send him, but he did not go because the U.S. Department of Agriculture would not permit importation of insects of unknown feeding habits.

Permission to import beetles from Australia was given to the University of California in 1944—with the proviso that additional feeding trials be held to determine effects on California crops.

The Klamath beetles were released on February 12, 1946. The Klamath Weed has been eradicated, and now the beetle has disappeared, since it will not feed on any other plant.

While the Klamath beetle was thriving, land in the infested area could not be sold for any price. Today—thanks to the beetle—many thousands of acres in northwestern California and Oregon are again productive and the land is worth from $200 to $1,000 an acre.

The monument was placed in the new agricultural building in Eureka. The inscription on it reads: "In appreciation of the combined efforts of Farm Advisor Douglas Pine, Dr. A. W. Sampson, Dr. Harry S. Smith, University of California and the Entomology Research Division, U.S.D.A. for their work which led to the introduction of the Klamath Weed Beetle for the eradication of Klamath Weed from our range lands. Humboldt County Cattlemens Assoc., Humboldt County Wool Growers Assoc., Humboldt County Farm Bureau."

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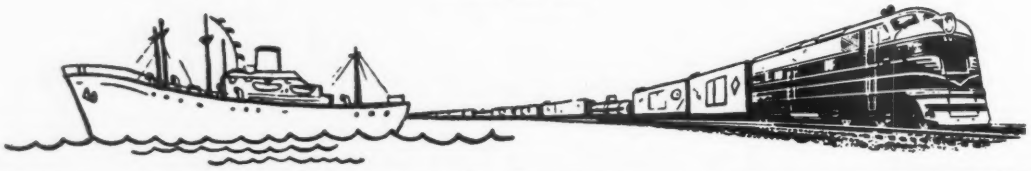

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"During the development of the H-25," Mr. Beyerstedt explained, "as soon as it became evident that we were going to obtain the increased capacity, production, ease of operation, speed and mobility we sought, our engineers then gave major attention to protective features for operational insurance against wear, maintenance, abuse, downtime and the like.

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"Starting with the *triple* air cleaning system (1) we have provided a precleaner and dual oil-bath air cleaners for engine intake, and crankcase breather tube (17).

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"The reservoir (4) of the closed, pressure-controlled hydraulic system has built-in cartridge-type filter and *sealed* dip-stick."

In discussing the components of the electrical system, Mr. Beyerstedt said, "There is a 12-volt system with the battery grounded direct to the starter housing; a non-vented, *sealed* generator (5); *sealed* ignition distributor (6); shock-mounted instrument panel (7) with solder-coated terminals and a plastic-coated wiring harness (8); *sealed* circuit breaker together with *sealed* ignition and starter switches (9) plus clutch-pressure warning device (18).

"*Sealed* teflon bushings are used extensively throughout with brake and transmission disconnect mechanism (10) and valve control mechanism (11).

"These *sealed* ball joints (12) are used with gearshift linkage and *sealed* ball joints of a different size (13) are used with the accelerator linkage.

"The steering linkage uses *sealed* ball joints on the tie rods (14), and on the drag link (19). The steering bell crank (15) is *sealed*, also the spindle and kingpin assemblies.

"The boom arm mechanism has tapered roller bearings and dust covers on the bell cranks (16) and *sealed* mated bronze and steel bushings plus O-ring seals at all major pivot points."

Now, What About Production?

The carry capacity of the H-25 "PAYLOADER" is 2,500 lbs.—25% greater than has ever before been available in a tractor-shovel of its size and maneuverability, yet it easily loads and unloads box cars with narrow 6-foot doors. It is the only loader in its size range with *complete* power shift transmission—having 2 speed ranges forward and two in reverse. Power-steer is also standard so that operating speed and handling ease favors all-out production all day without operator fatigue.

Other plus features of the H-25 that mean more production, less maintenance and longer life are the exclusive power-transfer differential, wet-sleeve overhead valve engine, full-shift fuel capacity, 4,500 lbs. of bucket breakout force and 40° bucket tip-back at ground level.

Your "PAYLOADER" Distributor wants to show you how the greater capacity, speed and handling ease of the H-25 can cut your bulk-handling costs. Ask him about Hough Purchase and Lease Plans, too. The Frank G. Hough Co., 704 Sunnyside Ave., Libertyville, Ill.

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The H-25 "PAYLOADER" is effectively shielded against dust, dirt and foreign materials.